

**NBSIR 79-1592**

# **Examination of "Upholstered, Rotary, Molded Plastic, Double Shell Chairs"**

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January 1979

Final

Prepared for  
**United States Senate**  
**Committee on Governmental Affairs**  
**Subcommittee on Federal Spending**  
**Practices and Open Government**



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## Executive Summary

At the request of the Senate Subcommittee on Federal Spending Practices and Open Government, The National Bureau of Standards conducted tests on 10 "double shell" chairs to determine their compliance with Federal Specification AA-C-001771B, 8-1-75 (Contract Deviation and Amendment 3). These tests were centered in the Product Performance Engineering Division of the Center for Consumer Product Technology. Chairs from each of five manufacturers of "double shell" chairs were inspected for visual, dimensional, material, and physical characteristics for their compliance to the requirements in the specification documents. Mechanical tests were also performed where possible.

The visual examination concentrated on the appearance of the sample chairs and their adherence to the appropriate appearance specifications. The dimensional examination consisted of a complete check of specified dimensions, including seat height and tilt adjustments. The materials evaluation involved identification of the polyurethane foam, upholstery fabric, plastic inner and outer shell material, and the chrome plating. The physical evaluation involved internal visual and dimensional examination of the chair components and the manufacturing techniques used in product assembly. The mechanical tests consisted of static load tests on the bases, arms, and spindles of the chairs.

The following table lists the total "defects" for each of the chairs tested. The term "defect" is applied to "any nonconformance of the unit of product with specified requirements" (per Military Standard 105D - Sampling Procedures and Tables for Inspection by Attributes) and is consistent with the usage of this term in the Federal Specification AA-C-001771B.

Specimen Identification (See Table 1, Page 13)	Chair <sup>(a)</sup> Type	Chair <sup>(a)</sup> Style	Total Defects
A	I	A	6
B	II	A	11
C	II	B	4 (6) <sup>(b)</sup>
D	III	A	12
E	III	B	9
F	IV	B	12
G	II	A	12
H	III	B	10
I	I	A	3 (6) <sup>(c)</sup>
J	II	B	7

- (a) See specification (Section 1) for detailed chair descriptions.
- (b) Specimen C, which is nominally the same as Specimen J, contained four defects, however, no material evaluations were performed. If tests on Specimen C produced the same material defects as were produced by tests on Specimen J, then a total of six defects would have been reported.
- (c) Specimen I, which is nominally the same as Specimen A, contained three defects, however, no material evaluations were performed. If tests on Specimen I produced the same material defects as were produced by tests on Specimen A, then a total of six defects would have been reported.

The results of the evaluation procedures and tests show that none of the chairs met the specification in its entirety. It should be noted that this lack of specification compliance may not necessarily mean that a particular defect will result in an inferior product. For example, the specification of particular materials, besides precluding the use of inferior materials, also precludes the use of better, recently developed, and possibly less expensive materials.

## 1. INTRODUCTION

Testimony before the Senate Subcommittee on Federal Spending Practices and Open Government contained directly conflicting statements about whether "double-shell" chairs manufactured by the firm Art Metal-U.S.A., Inc. met the design specifications Federal Specification AA-C-001771B, 8-1-75, and Contract Deviation and Amendment #3. As a result of this conflict the National Bureau of Standards was requested by the Subcommittee to test specimens from each of five manufacturers of "double shell" chairs to determine their compliance with the federal specifications. This report contains the results of the tests conducted by NBS.

## 2. FEDERAL SPECIFICATION

The Federal specification covering the "double shell" chair is AA-C-001771B (GSA-FSS), 8-1-75 with contract deviation and amendment 3, 12-8-77. This specification, entitled "Chairs, Double Shell, Molded Plastic, Rotary, Upholstered", covers upholstered (desk, side, and secretarial) chairs of the molded-plastic double-shell design of contemporary style. The complete Federal specification document and amendment are included as attachments to this report in Appendix 1. The specification and amendment documents will hereafter be referred to as Federal Specification AA-C-001771B.

Due to the short time allotted for testing, the tests performed on the chairs were limited in scope to a general examination (visual inspection, dimensional check, and physical evaluation) of the complete product, and to several of the material and mechanical tests on the chairs or their components. Not all sections of the specification were checked for compliance. Those major areas that received consideration are listed below (section numbers in this list are those in the Federal Specification AA-C-001771B).

1. SCOPE AND CLASSIFICATION.
3. REQUIREMENTS
  - 3.2 Material.
  - 3.3 Design, dimensions.
  - 3.4 Construction.
  - 3.5 Pretreatment and finishing.
  - 3.6 Pretreatment and finishing, plated finish.
  - 3.7 Identification label.
  - 3.8 Workmanship.
  - 3.9 Printed adjustment instructions.
4. QUALITY ASSURANCE PROVISIONS
  - 4.4 Inspection (end item).
  - 4.5 Tests (end item).

The specific inspections and tests performed on each chair will be detailed in Section 4 of this report.

### 3. CHAIR SPECIMENS

Ten chairs, selected by staff members of the Subcommittee on Federal Spending and Open Government, were received in two separate shipments. These chairs consisted of at least one chair of each Type and Style as covered in Section 1. SCOPE AND CLASSIFICATION of Federal Specification AA-C-001771B, and at least one chair sample from each of five manufacturers of "double shell" chairs. A listing of the assigned specimen letter designation, chair manufacturer code, chair type and style for the 10 specimen chairs is given in Table 1. Photographs of each chair specimen are provided in Figures 1 to 10.

The inspection and test results pertain to the evaluation of the chairs supplied by the subcommittee staff. These chairs are single production samples. Preproduction accessories or component parts as required by the specification were not supplied. Thus, the results of tests on these samples and their components may not be statistically representative of a production run.

#### 4. INSPECTION PROCEDURES

The inspection of each chair consisted of a visual examination, dimensional examination, materials evaluation, physical evaluation, and mechanical tests. These categories, as well as their order of appearance in the text, were arbitrarily chosen as an aid in report preparation and for clarity of presentation. These categories are not intended to reflect the order of the examination and testing of the specimens.

##### 4.1 Visual Examination

The visual examination concentrated on the external appearance of a complete sample chair and its adherence to the following sections of Federal Specification AA-C-001771B:

### 3. REQUIREMENTS

#### 3.4 Construction.

3.4.1 Assembly of metal parts. In particular, exposed welds shall be ground smooth to present a finished appearance.

#### 3.5 Pretreatment and finishing.

3.5.2 Finishing.

#### 3.6 Pretreatment and finishing, plated finish.

3.6.2 Chromium plating.

#### 3.7 Identification label.

#### 3.8 Workmanship.

#### 3.9 Printed adjustment instructions.

### 4. QUALITY ASSURANCE PROVISIONS

#### 4.4 Inspection (end item).

4.4.1 Visual examination.

Overall results from the visual examination for each chair specimen are presented in Section 5.1 of this report.

## 4.2 Dimensional Examination

The dimensional examination consisted of the measurement of the dimensions specified in Table II of Federal Specification AA-C-001771B, along with the seat height and tilt adjustment requirements of the specification documents. The appropriate specification references are:

### 3. REQUIREMENTS

#### 3.2 Material.

##### 3.2.5 Hardware.

##### 3.2.5.4 Chair controls.

##### 3.2.5.4.1 Chair controls, Type I, Type II chairs.

##### 3.2.5.4.3 Seat tilting unit - Type I and Type II chairs.

##### 3.2.5.4.4 Chair controls, Type IV chairs.

##### 3.2.5.4.5 Back tilting unit, Type IV chairs.

#### 3.3 Design, dimensions.

##### 3.3.2 Dimensions. (Table II)

The measurements taken on each chair are shown in Table 2 of this report.<sup>(a)</sup> The lack of compliance with the specified range of dimensions is reported. Complete overall results from the dimensional examination of each chair specimen are presented in Section 5.1 of this report.

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<sup>(a)</sup>As an aid to comparing test results with specification requirements, units used for physical quantities in this paper are given in U.S. Customary Units. It should be noted, however, that the U.S.A. is a signatory to the 11th General Conference on Weights and Measures which gave official status to the International System of Units (SI) in 1960.

## 4.3 Materials Evaluation

An evaluation of the material components used in the construction of each chair was performed. (Two of the chairs, Specimens C and I, were nominally the same as Specimens J and A respectively. Material components from those specimens were not evaluated.) The materials evaluation was limited to identification of the polyurethane foam, upholstery fabric, plastic inner and outer shell material, and chromium plating. These evaluations are covered in Federal Specification AA-C-001771B, under the following sections:

### 3. REQUIREMENTS.

#### 3.2 Material

3.2.2 Polyurethane foam. - Tests for original compression set and density only.

3.2.3 Upholstery fabric. - Tests for nylon, weave, weight, and abrasion resistance

#### 3.4 Construction

3.4.4 Shells.

3.4.4.1 Shells, Type I, II, and III chairs. (a) and (b)

3.4.4.2 Shells - Type IV chairs. (a) and (b)

3.4.5 Arms.

3.4.5.1 Arms. Type I, II, and III Style A chairs.

3.4.6 Detail requirements (per Type and Style of chair).

3.4.6.1 Type I, Style A chairs.

3.4.6.1.6 Seat and back padding.

3.4.6.2 Type II, Style A chair.

3.4.6.2.6 Seat and back padding.

3.4.6.6 Type IV. Style B chair.

3.4.6.6.7 Seat and back padding.

3.6 Pretreatment and finishing, plated finish.

3.6.2 Chromium plating. - Characteristics as specified except visual match with Government sample.

#### 4. QUALITY ASSURANCE PROVISIONS

4.5 Tests (end item).

4.5.8 Test for upholstery fabric.

4.5.9 Chromium plating test.

4.5.14 Adhesion Test.

Several of the tests required for complete characterization of the polyurethane foam and upholstery fabric were not performed due to the required specimen sizes or numbers, the limited availability of material, the need for virgin material, or the lack of the required test equipment. Overall results from the materials evaluation for each chair specimen are presented in Section 5.1 of this report.

#### 4.4 Physical Evaluation

The physical evaluation of each specimen involved the internal visual and dimensional examination of the chair components and the manufacturing techniques involved in the assembly of the major chair components into completed products. The manufacturing options available for use are covered in Federal Specification AA-C-001771B under the following headings

#### 3. REQUIREMENTS

3.2 Material.

3.2.5 Hardware.

3.2.5.2 Casters

3.2.5.3 Glides.

3.2.5.4 Chair Controls.

3.2.5.4.1 Chair controls, Type I. Type II chairs.

3.2.5.4.2 Chair controls, Type III chairs.

3.2.5.4.3 Seat tilting unit - Type I and Type II chairs.

3.2.5.4.4 Chair controls, Type IV chairs.

3.2.5.4.5 Back tilting unit, Type IV chairs.

3.2.5.4.6 Chassis, spider arms and spindle.

3.2.5.4.7 Replaceable "J" washers..

### 3.4 Construction.

3.4.3 Base. (a), (b)

3.4.4 Shells.

3.4.4.1 Shells, Type I, II, and III chairs.

3.4.4.1.1 Base fastening devices for Types I, II, and III chairs.

3.4.4.2 Shells - Type IV chairs.

3.4.4.2.1 Base fastening devices for Type IV chair.

3.4.5 Arms.

3.4.6 Detail requirements (per Type and Style of chair).

3.4.6.1 Type I Style A chairs. - Requirements as previously specified in sections pertaining to the chair control (3.2.5.4.1), shells (3.4.4.1), arms (3.4.5), and chassis spider arms and spindle (3.2.5.4.6).

3.4.6.1.1 Base.

3.4.6.1.6 Seat and back padding. (a). (b)

3.4.6.1.7 Upholstery cover and shell attachment. (a), (b)

3.4.6.2 Type II, Style A chair. - Requirements as previously specified in sections pertaining to the base (3.4.6.1.1), chair controls (3.2.5.4.1), shells (3.4.4.1), arms (3.4.5), and chassis, spider arms and spindle (3.2.5.4.6).

- 3.4.6.2.6 Seat and back padding. (a), (b)
- 3.4.6.2.7 Upholstery cover and shell attachment.  
(a), (b)
- 3.4.6.3 Type II, Style B chair. - Requirements as previously specified in sections pertaining to the base (3.4.6.1.1), chair controls (3.2.5.4.1), shells (3.4.4.1), chassis, spider arms and spindle (3.2.5.4.6), seat and back padding (3.4.6.2.6), and upholstery cover and shell attachment (3.4.6.2.7).
- 3.4.6.4 Type III, Style A chair. - Requirements as previously specified in sections pertaining to the chair controls (3.2.5.4.2) shells (3.4.4.1), arms (3.4.5), seat and back padding (3.4.6.2.6), and upholstery cover and shell attachment (3.4.6.2.7).
  - 3.4.6.4.1 Base.
  - 3.4.6.4.4 Chassis, spider arms and spindle.
- 3.4.6.5 Type III, Style B chair. - Requirements as previously specified for the base (3.4.6.4.1), chair controls (3.2.5.4.2), shells (3.4.4.1), chassis, spider arms and spindle (3.4.6.4.4), seat and back padding (3.4.6.2.6), and upholstery cover and shell attachment (3.4.6.2.7).
- 3.4.6.6 Type IV, Style B chair. - Requirements as previously specified in sections pertaining to the base (3.4.6.1.1), chair controls (3.2.5.4.4), back tilting unit (3.2.5.4.5), shells (3.4.4.2), and the chassis, spider arms and spindle (3.2.5.4.6).
  - 3.4.6.6.6 Back upright.
  - 3.4.6.6.7 Seat and back padding.
  - 3.4.6.6.8 Seat upholstery cover and shell attachment.

### 3.4.6.6.9 Back upholstery cover and shell attachment.

Overall results from the physical evaluation for each chair specimen are given in Section 5.1 of this report.

## 4.5 Mechanical Tests

Several performance tests, on each type and style of chair produced under contract, are required by the specification to assure continuous quality production. These performance tests include both static load and durability tests. Because of severe time constraints and lack of readily available test equipment only three of the five static load tests and none of the four durability tests were performed. The tests that were performed are covered in Federal Specification AA-C-001771B under the following headings:

### 4. QUALITY ASSURANCE PROVISIONS

#### 4.5 Tests (end item).

4.5.3 Base Test, static load, for all types of chairs (Figure 9)

4.5.4 Arm Tests for Style A chairs (Figure 10).

4.5.4.1 Arm deflection test.

4.5.4.2 Arm attachment test.

4.5.7 Spindle attachment test. (a)

The results from the arm deflection and attachment tests are given in Table 3. Complete overall results from the mechanical tests of each chair specimen are presented in Section 5.1 of this report.

## 5. INSPECTION RESULTS

### 5.1 Overall Results

The overall inspection and test results for the group of 10 chairs are presented in tabular form for each of the inspection categories. The overall results from the visual examination, dimensional examination, materials evaluation, physical evaluation, and mechanical tests are given in Tables 4, 5, 6, 7, and 8 respectively. Defects<sup>(a)</sup> are given a letter designation of "F" in a specimen column. This indicates failure of that specimen to comply with the specification section in the corresponding horizontal row. The reasons for the defect ratings for each individual specimen are detailed in 5.2, Individual Test Results, of this report.

### 5.2 Individual Test Results

The defect report for each specimen is given in Tables 9 to 18. These tables identify by section the specific defect which resulted in a non-compliance rating for each specimen. Each defect is classified as "major" or "minor" per Table III and Sections 4.4.1 and 4.4.2 of Federal Specification AA-C-001771B, whenever possible. Defects not classified in Table III are identified as "not listed".

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(a) The term "defect" is applied to "any nonconformance of the unit of product with specified requirements" (per Military Standard 105D - Sampling Procedures and Tables for Inspection by Attributes) and is consistent with the usage of this term in the Federal Specification AA-C-001771B.

## 6. CONCLUDING REMARKS

At the request of the Senate Subcommittee on Federal Spending Practices and Open Government, the National Bureau of Standards conducted tests on 10 "double shell" chairs to determine their compliance with Federal Specification AA-C-001771B. Chairs from each of five manufacturers of "double shell" chairs were inspected for visual, dimensional, materials, and physical characteristics for adherence to the requirements in the specification. Mechanical tests were also performed where possible. The results of the evaluation procedures and tests show that none of the chairs tested passed the specification in its entirety. Each chair had several defects. These defects include both major and minor defects as classified in Table III of the Federal Specification AA-C-001771B as well as defects which are "not listed". The "not listed" defects, if included in Table III, would have been divided between "major" and "minor". This lack of specification compliance may not necessarily mean that a particular defect, even those classified as "major", will result in an inferior product. For example, in the particular cases involving materials, the specification of a particular material for product construction precludes the use of any better, recently developed material. In such cases, the desirability of a performance standard rather than a "prescriptive" specification is readily seen.

This work was centered in the Product Performance Engineering Division of the Center for Consumer Product Technology. The efforts of James Huckeba and Robert Snyder, members of the Center staff, in several task areas associated with the chair evaluations are gratefully acknowledged. Assistance was also received from Fielding Ogburn of the Center for Materials Science, and Dr. Paul Campbell and Dr. Gerald Sleater of the Center for Building Technology for analysis and testing of chromium plating specimens. Sincere appreciation is extended to Dottie Clayton, with assistance from Rose Massengill, for her excellent efforts expended in manuscript preparation.

Table 1 - Specimen Identification

Specimen	Manufacturer	Type	Style	Date of Manufacture	Figure No.
A	1	I	A	Apr, 1978	1
B	2	II	A	1978	2
C	3	II	B	1977	3
D	4	III	A	1977	4
E	5	III	B	1978	5
F	2	IV	B	1978	6
G	5	II	A	1978	7
H	3	III	B	1977	8
I (a)	1	I	A	Dec, 1977	9
J (b)	3	II	B	1977	10

(a) Specimen I is nominally the same as Specimen A with exception of chassis, spider arms and spindle assembly. Material components from Specimen I were not evaluated.

(b) Specimen J is nominally the same as Specimen C. Material components from Specimen C were not evaluated.

Table 2. Specimen Dimensions

SPECIMEN	Type I		Type II			Type III			Type IV
	Style A	Style B	Style A	Style B	Style C	Style D	Style E	Style F	Style G
A. Seat Depth	18 1/2	17 3/8	17	17	17	18 1/2	17	17	17 3/4
B. Back Height	23 1/4	19*	18	14*	14*	17 3/4	17 3/4	14*	-
C. Seat Height (No adjustment)	-	-	-	-	-	18	17 5/8	17 5/8	-
Seat Height (Lowest adjustment setting)	18 5/8*	17	18 1/4*	18 1/8*	18 1/4*	-	-	-	17
D. Overall Height (No adjustment)	-	-	-	-	-	32 5/8	32 1/2	30*	-
Overall Height (Lowest adjustment setting)	38 1/2	33 3/4	32 1/2	30 7/8	30 3/4	-	-	-	-
E. Center to Center Caster or Glide Pintle	27 1/4	25	26 3/4	26 3/4	26 3/4	26	27	26 3/4	25
F. Width Between Arms	22	21 5/8	21 15/16	-	-	20 5/8	-	-	-
G. Width of Seat	-	-	-	20	20	-	22 1/4*	20	17 3/4
H. Width of Chair Back (Max.)	-	-	-	-	-	-	-	-	16
I. Height of Chair Back (Max.)	-	-	-	-	-	-	-	-	9 1/2
J. Height Adjustment	2 1/2	2*	2 1/2	2 3/16	2 1/4	-	-	-	-
K. Tilt Adjustment (degrees)	20	19	18 1/2	17 1/2	19	-	-	-	25*

\*Out of tolerance

Note: All dimensions, except row K., are in inches.

- Indicates that dimensions are not specified

Table 3 - Results of the Arm Deflection and Attachment Tests for Style A Chairs

Specimen	Arm	Load lbf	Deflection in	Distortion After Unloading in	Pass	Fail
A	R	40 175-0	13/16	1/4	X	X
A	L	40 175-0	13/16	1/4	X	X
B	R	40 175-0	3/8	3/32	X X	
B	L	40 175-0	7/16	0	X X	
D	R	40 175-0	1/4	3/16	X X	
D	L	40 175-0	11/32	1/8	X X	
G	R	40 175-0	3/8	3/8	X	X
G	L	40 175-0	1/4	1/2	X	X
I	R	40 175-0	7/8	3/16	X	X
I	L	40 175-0	13/16	3/16	X	X

Table 4 - Overall Results of the Visual Examination

Specification Section	Title and Comments	All Specimens Pass	Specimen																	
			A	B	C	D	E	F	G	H	I	J								
3.4.1	Assembly of metal parts						F	F												
3.5.2	Finishing	X																		
3.6.2	Chromium plating - visual examination	X																		
3.7	Identification label						F	F					F							F
3.8	Workmanship													F						
3.9	Printed adjustment instructions														F					



Table 6 - Overall Results from the Materials Evaluation.

Specification Section	Title and Comments	All Specimens Pass	Specimen (a)											
			A	B	C	D	E	F	G	H	I	J		
3.2.2	Polyurethane foam.		F	F	F	F	F	F	F	F	F	F	F	F
3.2.3	Upholstery fabric.	X												
3.4.4.1	Shells, Type I, II, and III chairs.		F	F	F	F	F	F	F	F	F	F	F	F
3.4.4.2	Shells - Type IV chairs.									F				
3.4.5	Arms.	X												
3.4.6.1.6, 3.4.6.2.6 and 3.4.6.6.7	Seat and back padding.		F	F	F	F	F	F	F	F	F	F	F	F
3.6.2	Chromium plating.		F	F	F	F	F	F	F	F	F	F	F	F
4.5.8	Tests for upholstery fabric.	X												
4.5.9	Chromium plating test.		F	F	F	F	F	F	F	F	F	F	F	F
4.5.14	Adhesion test. (Specimens H and J only)	X	F	F	F	F	F	F	F	F	F	F	F	F

(a) Specimens C and I were not examined for materials compliance with the specification. These specimens are nominally the same as Specimens J and A respectively.



Table 8 - Overall Results from the Mechanical Tests

Specification Section	Title and Comments	All Specimens Pass	Specimen																		
			A	B	C	D	E	F	G	H	I	J									
4.5.3	Base test, static load, for all types of chairs (Figure 9).																				
4.5.4.1	Arm deflection test.	F																			F
4.5.4.2	Arm attachment test.																				F
4.5.7	Spindle attachment test. (a) 100 ft-lb torque																				F

Table 9 - Defect Report for Specimen A

Defect Classification  
(per Table III of  
AA-C-001771B)

Inspection Type	Specification Section	Title	Reasons for Defect Rating	Defect Classification (per Table III of AA-C-001771B)
1. Visual	-		(No defects)	-
2. Dimensional	3.3.2	Dimensions.	Seat height (lowest adjustment setting) is 18 5/8 in - (3/8 in more than specified).	Minor
3. Materials	3.4.6.1.6	Seat and back padding.	Pad in upper back area measured thickness of 1.497 in failed to meet the required minimum thickness of 1 3/4 in.	Major
	3.6.2	Chromium plating.	Chromium plate thickness of 0.004 mil is less than 0.01 mil required; and Nickel undercoating of 0.2 mil (average) is less than 0.5 mil required.	Not listed
4. Physical	4.5.9	Chromium plating test.	Severe corrosion and pitting over entire surface of specimen.	Not listed
	3.2.5.4.6	Chassis, spider arms and spindle.	Spindle exposed with chair in low position (Figure 12).	Not listed
5. Mechanical	4.5.4.1	Arm deflection test.	Applied load of 40 lbf produced a 13/16 inch deflection in both the right and left arms. This deflection is 1/16 inch more than allowed.	Not listed

Table 10 - Defect Report for Specimen B

Inspection Type	Specification Section	Title	Reasons for Defect Rating	Defect Classification (per Table III of AA-C-001771B)
1. Visual	-	-	(No defects.)	-
2. Dimensional	3.2.5.4.1	Chair controls, Type I, Type II chairs	Height adjustment of 2 in (1/4 in less than specified).	Minor
	3.3.2	Dimensions.	Back height of 19 in (1 in more than specified).	Minor
3. Materials	3.2.2	Polyurethane foam.	Original compression set test at 90% deflection; maximum allowable set: 15%. - seat pad set: 84.4%.	Not listed
	3.4.4.1	Shells, Type I, II and III.	(a) Inner shell is molded from polyethylene/propylene copolymer - not material specified. (b) Outer shell is molded of ABS (acrylonitrile-butadiene-stryrene) plastic - not material specified.	Major
	3.6.2	Chromium plating.	Chromium plate thickness of 0.003 mil is less than the 0.01 mil required.	Not listed
	4.5.9	Chromium plating test.	Severe corrosion and pitting along welded end of base leg. Other areas free of corrosion defects.	Not listed
4. Physical	3.2.5.4.6	Chassis, spider arms and spindle.	Spindle exposed when chair is in low position. (Figure 13)	Not listed
	3.4.4.1.1	Base fastening devices for Types I, II, and III chairs.	Base is bolted to steel plate inside outer shell. Plate is not galvanized as specified.	Not listed
	3.4.5	Arms.	One piece plastic arm formed as part of shell - not allowed by specification.	Not listed
5. Mechanical	3.4.6.2.7	Upholstery cover and shell attachment.	No perimeter bumper molding.	Not listed
	-	-	(No defects.)	-

Table 11 - Defect Report for Specimen C

Inspection Type	Specification Section	Title	Reasons for Defect Rating	Defect Classification (per Table III of AA-C-001771B)
1. Visual	3.7	Identification label.	Size (1 1/2 in x 4 in) is not as specified (1 1/4 in + 1/4 in x 2 1/4 in + 1/4 in).	Not listed
	3.9	Printed adjustment instructions.	Not clear - use of auxiliary tool (supplied with the chair) is not clearly addressed.	Not listed
2. Dimensional	3.3.2	Dimensions.	Back height of 14 in (3/4 in less than specified).	Minor
			Seat height (lowest adjustment setting) of 18 1/8 in (1/8 in more than specified).	Minor
3. Materials	-		No materials evaluations were performed. Specimen C is nominally the same as Specimen J.	
4. Physical	-	-	(No defects.)	-
5. Mechanical	-	-	(No defects.)	-

Table 12 - Defect Report for Specimen D

Defect Classification  
(per Table III of  
AA-C-001771B)

Inspection Type	Specification Section	Title	Reasons for Defect Rating	Defect Classification
1. Visual	3.4.1	Assembly of metal parts parts	Exposed welds at bottom of base, similar to the welds shown in Figure 11 for Specimen G, not ground smooth to present finished appearance.	Not listed
	3.7	Identification label.	Size (1 1/2 in x 2 3/4 in) is not as specified (1 1/4 in ± 1/4 in x 2 1/4 in ± 1/4 in); Paper label instead of metal label.	Not listed
2. Dimensional	-	-	(No defects.)	
3. Materials	3.2.2	Polyurethane foam.	Original compression set test at 90% deflection, maximum allowable set: 15%. - upper back pad set: 32.1%.	Not listed
	3.4.4.1	Shells, Type I, II, and III chairs.	Inner shell is molded of polyethylene/polypropylene copolymer - not one of the specified materials; (Outer shell is molded of polyethylene/polypropylene copolymer not one of the specified materials.	Major
	3.4.6.2.6	Seat and back padding.	The back pads were constructed as specified in Section 3.4.6.1.6 (a); The upper back pad measured thickness of 1.658 in failed meet the required minimum thickness of 1 3/4 in; and The lower back pad measured at 1.381 in failed to meet the required minimum thickness of 1 1/2 in. The seat cushion was a two-piece construction similar to the construction requirements of Section 3.4.6.1.6 (b).	Major
	3.6.2	Chromium plating.	Chromium plate thickness of 0.004 mil is less than 0.01 mil required; and Nickel undercoat of 0.46 mil (average) less than 0.5 mil required.	Major
	4.5.9	Chromium plating test.	Corrosion stain in vicinity of glide socket. Other areas free of corrosion defects.	Not listed
4. Physical	3.2.5.1	Glides.	Slightly oversized at 1.11 in (1 1/16 in maximum allowable). Hardness value of 65 (average of 6 readings) is less than 65 specified (15 N scale).	Not listed
	3.2.5.4.6	Chassis, spider arms and spindles.	Measured web dimension of 0.80 to 0.97 inch is less than 1 inch specified.	Not listed
5. Mechanical	-	-	(No defects.)	

Table 13 - Defect Report for Specimen E

Inspection Type	Specification Section	Title	Reasons for Defect Rating	Defect Classification (per Table III of AA-C-001771B)
1. Visual	3.4.1	Assembly of metal parts	Exposed welds at bottom of base - similar to the welds shown in Figure 11 for Specimen G - not ground smooth to present finished appearance.	Not listed
2. Dimensional	3.3.2	Dimensions.	Width of seat = 22 1/4 in (1/4 in more than specified).	Minor
3. Materials	3.4.4.1	Shells, Type I, II, and III chairs.	(a) Inner shell is molded from polyethylene/polypropylene copolymer-not material specified. (b) Outer shell is molded from polyethylene/polypropylene copolymer - not material specified.	Major
	3.6.2	Chromium plating.	Nickel undercoat of 0.17 mil (average) is less than 0.5 mil required.	Not listed
	4.5.9	Chromium plating test.	Corrosion stains from vicinity of top weld corner and glide socket. Other areas free of corrosion defects.	Not listed
4. Physical	3.2.5.4.6	Chassis, spider arms and spindle	Measured web dimension of 0.9 in is less than 1 in specified.	Not listed
	3.4.3	Base. (paragraph (a))	Slope of base leg is 1/8 in less than specified 1/4 in on top surface.	Not listed
5. Mechanical	4.5.3	Base test, static load, for all types of chairs (Figure 9).	Permanent distortion, after load, of 0.076 in (in excess of allowed distortion of 0.062 in).	Not listed

Table 14 - Defect Report for Specimen F

Inspection Type	Specification Section	Title	Reasons for Defect Rating	Defect Classification (per Table III of AA-C-001771B)
1. Visual	3.8	Workmanship	Permanent distortion in seat pad from shipping container packaging (Figure 6).	Major
2. Dimensional	3.2.5.4.5	Back tilting unit, Type IV chairs.	Measured tilt of 25 degrees - (exceeds maximum allowable tilt of 17 degrees).	Not listed
3. Materials	3.2.2	Polyurethane foam.	Original compression set test at 90% deflection; maximum allowable set: 15%. - seat pad set: 18.8%. - back pad set: 67.8%.	Not listed Not listed
	3.4.4.2	Shells - Type IV chairs.	(a) Inner shells (seat and back) molded of PE/P (polyethylene/polypropylene copolymer) - not one of the specified materials. (b) Outer shells (seat and back) molded from ABS (acrylonitrile-butadiene-styrene) plastic - not one of specified materials.	Major Major
	3.6.2	Chromium plating.	Chromium plate thickness of less than 0.001 mil is less than 0.01 mil required.	Not listed
	4.5.9	Chromium plating test.	Large corrosion stains from vicinity of top weld corner and caster socket. Other areas free of corrosion defects.	Not listed
4. Physical	3.2.5.4.6	Chassis, spider arms, and spindle.	Spindle exposed with chair in low position (Figure 13).	Not listed
	3.4.6.6.6	Back upright.	Not material specified; and no provision for prevention of accidental removal of upright.	Not listed
	3.4.6.6.8	Seat upholstery cover and shell attachment.	No perimeter bumper molding.	Not listed
	3.4.6.6.9	Back upholstery cover and shell attachment.	No perimeter bumper molding.	Not listed
5. Mechanical			(No defects.)	

Table 15 - Defect Report for Specimen G

Inspection Type	Specification Section	Title	Reasons for Defect Rating	Defect Classification (per Table III of AA-C-001771B)
1. Visual	3.4.1	Assembly of metal parts.	Exposed welds at bottom of base not ground smooth to present finished appearance - Figure 11.	Not listed
2. Dimensional	3.3.2	Dimensions	Seat height (lowest adjustment setting) of 18 1/4 in (1/4 more than specified).	Minor
3. Materials	3.2.2	Polyurethane foam.	Original compression set test at 90% deflection; maximum allowable at: 15% - back pad set: 30.8%	Not listed
	3.4.4.1	Shells, Type I, II and III chairs.	Inner is molded of polyethylene/polypropylene copolymer: not materials specified. Outer shell is molded of polyethylene/polypropylene copolymer - not material specified.	Major
	3.4.6.2.6	Seat and back padding.	Back pad consists of low density polyurethane foam-not one of the specified materials.	Not listed
	3.6.2	Chromium plating.	Nickel undercoat of 0.13 mil (average) is less than 0.5 mil required.	Not listed
	4.5.9	Chromium plating test.	Corrosion stains from vicinity of top weld corner and caster socket. Other areas free of corrosion defects.	Not listed
4. Physical	3.2.5.2	Castors.	Shore A hardness values not to specification. Average of 10 readings on each of 2 wheels was 83 1/2. (Specified values are 85 to 95).	Major
	3.2.5.4.3	Seat tilting unit - Type I and Type II chairs.	Tilting tension bolt measured as 0.35 in diameter is less than specified 3/8 in.	Not listed
	3.2.5.4.6	Chassis, spider arms and spindle.	Measured web dimension of 0.9 in is less than 1 in specified; Spindle exposed with chair in low position (Figure 12).	Not listed
5. Mechanical	4.5.3	Base test, static load for all types of chairs (Figure 9).	Permanent distortion after load of 0.20' in (in excess of allowed distortion of 0.062 in).	Not listed

Table 16 - Defect Report for Specimen H

Inspection Type	Specification Section	Title	Reasons for Defect Rating	Defect Classification (per Table III of AA-C-001771B)
1. Visual	3.7	Identification label.	Size (1 in x 3/1/2 in) is not as specified (1 1/4 in + 1/4 in x 2 1/4 in + 1/4 in); and paper label instead of metal label.	Not listed
	3.8	Workmanship.	Rocky base - one base leg more than 1/8 in off ground.	Major
2. Dimensional	3.3.2	Dimensions.	Back height of 14 in (3/4 in less than specified); and Overall height (no adjustment) of 30 in (1/4 in less than specified).	Minor
3. Materials	3.4.6.1.6	Seat and back padding. (paragraph b)	Seat and back padding consists of one piece of low density polyurethane foam. Required bottom insert of high density foam is missing.	Not listed
	3.6.2	Chromium plating.	Chromium plate thickness of 0.004 mil is less than 0.01 mil required; and Nickel undercoat of 0.39 mil (average) is less than 0.5 mil required.	Not listed
	4.5.9	Chromium plating test.	Scattered corrosion spots up to 1/8 in in length.	Not listed
4. Physical	3.2.5.3	Glides.	Slightly oversized at 1.08 in (1 1/16 in maximum allowable); and Hardness value of 82 (average of 3 readings) is less than 85 as required (15 N scale).	Not listed
	3.2.5.4.6	Chassis, spider arms and spindle.	Chassis extension along spindle is 3/8 in (3/4 in extension is specified).	Not listed
	3.4.3	Base. (paragraph b)	Bearing and spindle not as specified. Spindle bearing surface is 3 5/8 inches (should be 10 1/4 inches minimum in this design); alternatively there is no flanged thrust bearing at the bottom of the spindle. (No defects.)	Not listed
5. Mechanical				

Table 17 - Defect Report for Specimen I

Inspection Type	Specification Section	Title	Reasons for Defect Rating	Defect Classification (per Table III of AA-C-001771B)
1. Visual	-	-	(No defects.)	-
2. Dimensional	3.2.5.4.3	Seat tilting unit - Type I and Type II chairs.	Tilting tension bolt less than 3/8 in diameter specified (measured size 0.35 in shaft, 3/8 in thread).	Not listed
3. Materials	-	No materials evaluations were performed. Specimen I is nominally the same as Specimen A except for the chassis, spider arms and spindle assembly.		
4. Physical	3.2.5.4.6	Chassis, spider arms and spindle.	Spindle exposed with chair in low position (Similar to A in Figure 12)	Not listed
5. Mechanical	4.5.4.1	Arm deflection test.	Applied load of 40 lbf produced a 13/16 inch deflection in left arm and a 7/8 inch deflection in the right arm (exceeds the maximum allowable deflection of 3/4 inch).	Not listed

Table 18 - Defect Report for Specimen J

Inspection Type	Specification Section	Title	Reasons for Defect Rating	Defect Classification (per Table III of AA-C-001771B)
1. Visual	3.7	Identification label.	Size (1 1/2 in x 4 in) is not as specified (1 1/4 in + 1/4 in x 2 1/4 in + 1/4 in).	Not listed
	3.9	Printed adjustment instructions.	Not clear - use of auxiliary (supplied with the chair) is not clearly addressed.	Not listed
2. Dimensional	3.3.7	Dimensions.	Back height of 13 7/8 in (7/8 in less than specified); and Seat height (lowest adjustment setting) of 18 1/4 in (1/4 in more than specified).	Minor Minor
3. Materials	3.4.6.1.6	Seat and back padding (paragraph b)	Seat and back padding consists of one piece of low density polyurethane foam. Required bottom insert of high density foam is missing.	Not listed
	3.6.2	Chromium plating.	Chromium plate thickness of 0.003 mil is less than 0.01 mil required; and Nickel undercoat of 0.25 mil (average) is less than 0.5 mil required.	Not listed
4. Physical	-	-	(No defects.)	-
5. Mechanical	4.5.7	Spindle attachment test.	Spindle movement during test resulted in complete spindle removal. Spindle was pressed back into place and retested. It passed the second test.	Not listed



Figure 1 Specimen A, Type I, Style A.





Figure 2 Specimen B, Type II, Style A.





Figure 3 Specimen C, Type II, Style B.





Figure 4 Specimen D, Type III, Style A.





Figure 5 Specimen E, Type III, Style B.





Figure 6 Specimen F, Type IV, Style B.





G  
Type II  
Style A

Figure 7 Specimen G, Type II, Style A.





Figure 8 Specimen H, Type III, Style B.





Figure 9 Specimen I, Type I, Style A.





Figure 10 Specimen J, Type II, Style B.



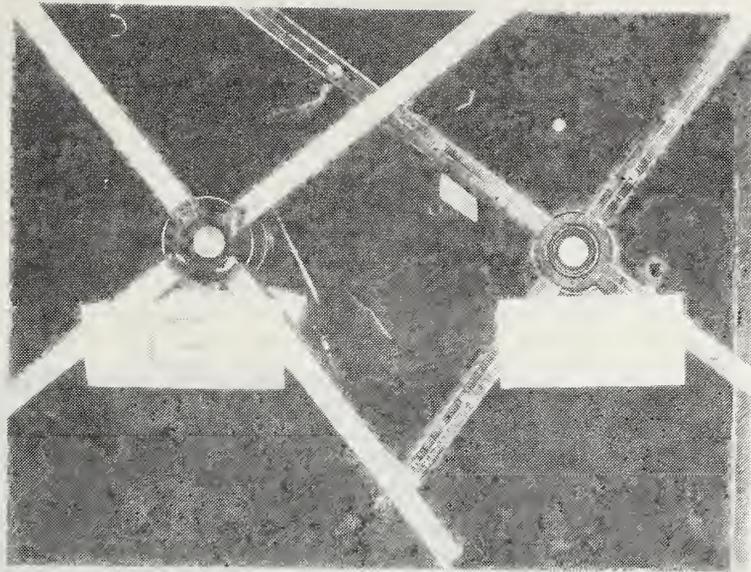


Figure 11 Exposed Unfinished Weld at Bottom of Base for Specimen G (defect); Covered Weld at Bottom of Base for Specimen B.

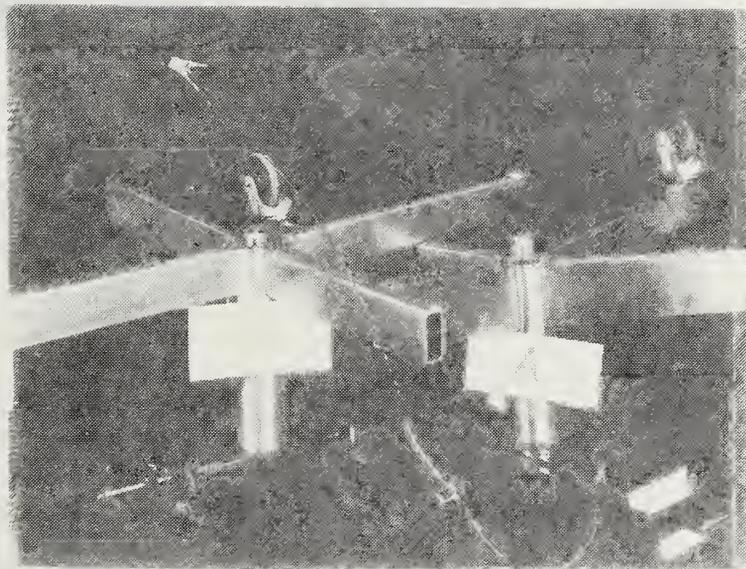


Figure 12 Spindles Exposed When in the Low Position for Specimens A and G. (defect)



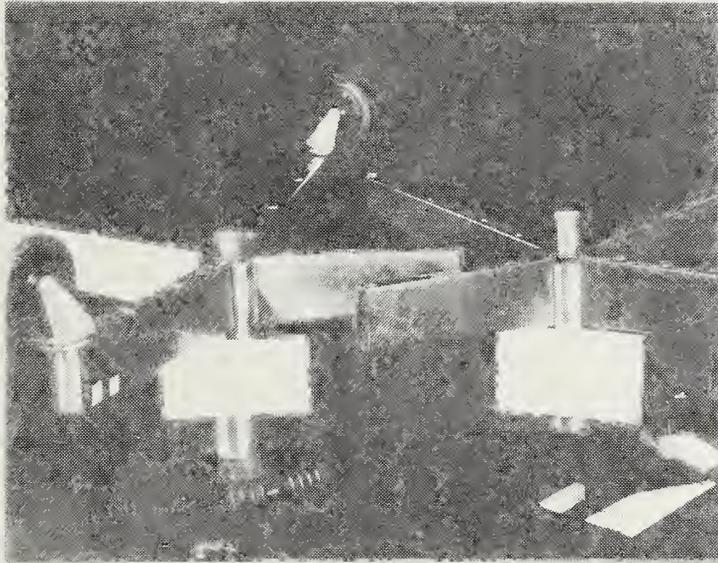


Figure 13 Spindles Exposed When in the Low Position  
for Specimens F and B. (defect)



APPENDIX 1. Federal Specification AA-C-001771B,  
(GSA-FSS), 8-1-75; and Contract  
Deviation and Amendment 3.



INTERIM FEDERAL SPECIFICATION

CHAIRS, DOUBLE SHELL, MOLDED PLASTIC,  
ROTARY, UPHOLSTERED

This Interim Federal Specification was developed by the National Furniture Center, Federal Supply Service, General Services Administration, Washington D.C., 20406, based on currently available technical information. It is recommended that Federal agencies use it in procurement and forward recommendations for changes to the preparing activity at the address shown above.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers upholstered chairs of the molded plastic double shell design of contemporary style. The desk chairs have rotary seat, tilting seat and back, height adjustment, and are equipped with casters. The side chairs have rotary seat (but do not have height adjustment) and are equipped with glides. The secretarial chairs have a rotary seat, tilting back, height adjustment and are equipped with casters.

1.2 Classification.

1.2.1 Types and styles. Chairs covered by this specification shall be of the following types and styles, as specified (see 6.2).

Type I - Desk chair, rotary, tilting seat and back, high back, adjustable seat height, casters, tufted upholstery.

Style A - with arms.

Type II - Desk chair, rotary, tilting seat and back, low back, adjustable seat height, casters, tufted upholstery.

Style A - with arms.

Style B - without arms.

Type III - Side chair, rotary, nontilting seat and back, fixed seat height, glides, tufted upholstery.

Style A - with arms.

Style B - without arms.

Type IV - Secretarial chair, rotary, nontilting seat, tilt back, adjustable seat height, adjustable back, casters, tufted upholstery.

Style B - without arms.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

Federal Specifications:

- FF-C-82 - Casters, Swivel, Chair.
- QQ-C-320 - Chromium Plating (Electrodeposited).
- QQ-N-290 - Nickel Plating (Electrodeposited).
- QQ-R-571 - Rods, Welding, Copper and Nickel Alloys.
- CCC-C-00540 - Cloth, Upholstery.
- PPP-P-1875 - Preparation for Delivery Requirements for Chairs, Metal and Plastic, Office.

Federal Standards:

- Fed. Test Method Std. No. 191 - Textile Test Methods.
- Fed. Test Method Std. No. 191/5100 - Breaking Strength and Elongation of Woven Cloth; Grab Method.
- Fed. Test Method Std. No. 191/5110 - Sewability of Woven Cloth; Seam Efficiency Method.
- Fed. Test Method Std. No. 191/5134 - Strength of Cloth, Tearing: Tonge Method.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington D.C., Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles and Seattle, WA.)

(Federal Government activities may obtain copies of Federal Specifications, Standards and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specifications:

- MIL-P-19834 - Plates, Identification or Instruction, Metal Foil, Adhesive Backed.
- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

- D 1564 - Tentative Methods of Test for Flexible Urethane Foam.
- B 117 - Salt Spray (Fog) Testing.
- D 1175 - Abrasion Resistance of Textile Fabrics.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

American Iron and Steel Institute, Publication:

Steel Products Manual, Carbon Steel Sheets.

(Application for copies should be addressed to the American Iron and Steel Institute, 150 East Forty-Second Street, New York NY 10017.)

U.S. Department of Commerce Publications:

Product Standard PS 13-69 - Uncored Slab Urethane Foam for Bedding and Furniture Cushioning.

(Copies of Commercial Standards and Product Standards may be obtained upon application, accompanied by money order, coupon or check, to the Superintendent of Documents, Government Printing Office, Washington D.C. 20402. Prices may be obtained from the Superintendent of Documents.)

3. REQUIREMENTS

3.1 Preproduction sample. Unless otherwise specified (see 6.2), before production is commenced, two samples (see 3.1.1) of each Type and Size of the finished commodity and each kind of accessory on contract and one of each component part thereof shall be submitted or made ready for the contracting officer or his authorized representative to examine and test to determine compliance with this document.

Approval of the preproduction sample authorizes the commencement of production, but does not relieve the contractor of responsibility for compliance with all other provisions of this document. Production units shall not vary from the approved preproduction sample in design or construction without written approval of the contracting officer.

3.1.1 Application of preproduction samples. One of the preproduction samples specified in 3.1 shall be used for the entire preproduction examination except the tests specified in 4.5. The other preproduction samples shall be used for the performance testing plus the internal examination specified in 4.5. If the chair is rejected because there are cracks or fractures in the unit of outer shells, a new set of samples shall be submitted and completely reexamined.

3.2 Material. All materials used shall be as hereinafter specified. They shall be unused in their present state and free from defects which affect serviceability or appearance of the finished product.

3.2.1 Steel. The steel sheets shall be of Commercial Quality cold rolled steel as defined in the Steel Products Manual, Carbon Steel Sheets. The steel shall be smooth, free from rust, scale, pits, scratches, laps, and buckles affecting strength or appearance. The gage numbers specified and the decimal equivalents thereof shall be in accordance with the steel products manual. Sample panels, representative of the steel and the gage thereof used in the manufacture of the commodities covered by this specification shall conform to the test specified in 4.5.10. Tubular steel shall be Commercial Quality SAE 1010-1020, seamless or continuously welded cold rolled steel. Alternatively, tubular steel may be number 434 high tensile, satin finished, stainless steel. Unless otherwise specified herein, the outside corners of all tubing shall be rounded.

3.2.2 Polyurethane foam. Polyurethane foam shall conform to the requirements of Table I when tested as specified in the applicable sections of ASTM Method D 1564.

Table I. Physical properties of polyurethane foam

Property	Low Density	Medium Density	High Density
25% indentation and deflection; lbs	14-31	31-37	37-64
Indentation load ratio (65%/25%) min.	1.75-2.4	1.9-2.6	1.9-2.83
Original compression set 22 hr/158 degrees F., 90% deflection; % maximum.	15%	15%	15%
Alternatively, maximum compression set at 50% deflection	5%	5%	5%
Steam autoclave test (condition B). Percent change in 25% compression load deflect; % maximum	20%	20%	20%
Compression set 22 hr/158 degrees F., 90% deflect; % maximum	20%	20%	20%
Alternatively, maximum compression set at 50% deflection	5%	5%	5%
Fatigue Test 25% indentation load ratio loss, % maximum	30%	30%	30%-20%
Thickness loss % maximum	5%	5%	5%
Rebound resilience	45%	45%	45%
Density Pounds/In. Ft.	1.8-2.2	2.7-3.4	2.7-4.75

3.2.3 Upholstery fabric. The upholstery fabric shall conform to Type VIII of CCC-C-00540, except that it shall be 100 percent flat nylon plain weave. The color shall be as specified in 3.2.3.1. The fabric shall conform to the requirements for the characteristics listed below.

<u>Characteristics</u>	<u>Requirement</u>	<u>Test Method 1/</u>
Tearing strength, lbs., minimum:		
Warp	40	5134
Filling	40	5134
Breaking strength, lbs., minimum:		
Warp	250	5100
Filling	250	5100
Abrasion resistance, cycles, minimum (Tabor Abrader, CS#10 wheels, 500 gram load)	8,000	ASTM D 1175
Seam efficiency	2/	5110

1/ Methods 5100, 5110 and 5134 and included in Federal Test Method Standard No. 191.

2/ Nylon thread of a size comparable to that specified in CCC-C-00540 may be used to test for the seam efficiency requirements of CCC-C-00540.

3.2.3.1 Color of upholstery fabric. The color of the upholstery fabric shall be as specified by the contracting officer (see 6.2). The colors specified below shall match the Government control sample for color. The Government sample numbers and colors are listed below.

Orange/Rust	FSS-F-01011
Sand/White	FSS-F-01015
Blue/Black	FSS-F-01005
Black/White	FSS-F-01014
Black/Brown	FSS-F-01012
Red/Black	FSS-F-01013
Green/Black	FSS-F-01016
Yellow/Gold	FSS-F-01018
Black	FSS-F-01009

### 3.2.4 Finishing materials.

#### 3.2.4.1 Painted finish.

3.2.4.1.1 Primer. The primer, when used, shall be compatible with the finishing enamel.

3.2.4.1.2 Enamel. The enamel for the finishing shall be of the baking type in accordance with the manufacturer's commercial product.

#### 3.2.4.2 Plated coating.

3.2.4.2.1 Chrome plating. The materials used in the plating process shall be as normally used commercially to accomplish the thickness and quality specified herein (see 3.6).

### 3.2.5 Hardware.

3.2.5.1 Fastening devices. Unless otherwise specified herein, all bolts, nuts, screws, washers and other fastening devices shall be of the type, style and size normally used commercially for the purpose intended and shall be made corrosion resistant in accordance with the manufacturer's commercial practice, except when paint or lacquer is involved. The use of paint or lacquer as the sole corrosion-resistant agent is prohibited.

3.2.5.2 Casters. The casters shall be Type I, Style A and wheel composition material 3 in accordance with FF-C-82, except that tapered wheels which are 15/16 inch thick at the axle and taper to 1/2 inch

thick at the outer circumference, will be permitted. The wheel diameter shall be 2-1/2 inches. In addition, the casters shall withstand the test specified in 4.5.5. The finish of the exterior metal surfaces of the caster shall match the plated finish used on the base within the limits of the caster manufacturer's commercial finish for executive chairs. Alternatively, when the base is provided as specified in 3.4.3(b), the finish of the exterior metal surface shall be provided in black epoxy finish to match the black finish of the vertical sides of the base. All casters shall have the proper caster sockets. The caster sockets shall be mounted into the base as specified in 3.4.3.1.

3.2.5.3 Glides. The glides shall be polished nickel plated or polished chromium plated or polished stainless steel. They shall be of the live-rubber-cushioned spring steel expansion type or rubber expansion type. Alternatively, they may be the metal expansion ring, pintel type. The glides shall be firmly secured to each leg and shall be capable of removal without the use of special tools. There shall be no metal-to-metal contact of glide base and base leg after the glides are applied. The glides shall have a diameter of not less than 15/16 inch or more than 1-1/16 inch. The glides shall have a substantially flat bottom. The base of the glide shall be stamped from not less than 0.030 inch thick steel and shall be case hardened after forming to a Rockwell hardness of not less than 15 N 85 or equivalent on a comparable scale. The base of the glide shall have rounded edges.

#### 3.2.5.4 Chair controls.

3.2.5.4.1 Chair controls, Type I, Type II chairs. The chair control mechanism shall have a low profile and shall extend not more than 3-1/2 inches below the bottom surface of the outer shell and shall have a single visible adjustment hand-hold to adjust tilt tension and a single hand wheel or spindle cover to accomplish height adjustment. Alternatively, seat tilt tension and height adjustment shall be made by means of an adjustment key clipped to a holding device permanently attached to under side of seat. The chair controls shall provide for seat height adjustment over a range of not less than 2-1/4 inches, revolving of the seat over a full 360 degrees and seat tilt adjustment over a range of not less than 16 degrees or more than 24 degrees (see 6.3). The seat tilt mechanism shall be as specified in 3.2.5.4.3. The chassis, spider arms and spindle shall be as specified in 3.2.5.4.3. All applicable parts of the mechanism shall be properly lubricated and all parts shall be finished as specified in 3.5 and the color shall be black, except that the height adjustment handwheel or spindle cover shall be plated as specified in 3.6.

3.2.5.4.2 Chair controls, Type III chairs. The Type III chairs shall rotate a full 360 degrees but shall not have seat tilting action or seat height adjustment. Alternatively, the chair control shall rotate not less than 320 degrees and the chair seat shall automatically return to its original position when the occupant leaves the seat. The chair control shall have a low profile, extending not more than 3-1/2 inches below the bottom surface of the outer shell. The chassis, spider and spindle shall be as specified in 3.2.5.4.6 except no provision for seat height adjustment is necessary and the spider may be formed from a steel plate rigidly secured to the chair shell in not less than four places by bolts, nuts and lockwashers. The spindle shall be completely covered by the base hub or by a cylindrical cover. The spindle cover shall be chromium plated as specified in 3.6.

3.2.5.4.3 Seat tilting unit - Type I and Type II chairs. The tilting units shall be the low profile type and shall not extend in excess of 3-1/2 inches below the bottom surface of the outer shell. The tilting units shall provide the tension against the tilting of the seat by means of springs, rubber torsion units, steel torsion rods, or any other means having commercial acceptance that allows for variable tension. Tilting tension bolts shall be not less than 3/8 inch diameter and must be entirely supported by the chair control structure, not the seat. The bolt shall have ample clearance through the entire tilting range to prevent breaking or wear by friction. The tilting unit shall have a positive safety stop that will limit the tilting action during normal use and in case of breakage or failure of the tension unit. The range of the tilting action shall be not less than 16 degrees nor more than 24 degrees. The seat tilting mechanism, utilizing a steel spring to provide tension in tilting, shall be permanently lubricated or equipped with nylon bearings and/or oil impregnated, powdered metal bearings to prevent wear on bearing surfaces. A control shall be provided for varying the amount of torque to give required tilting tension.

3.2.5.4.4 Chair controls, Type IV chairs. The chair shall have a suitable metal, low profile type rotary mechanism capable of revolving the seat over the full 360 degrees, a nontilt seat, a back upright tilt and a horizontal (front to rear) adjustment of the back upright. The chair mechanism shall not extend in excess of 3-1/2 inches below the outer shell. The provision for the horizontal adjustment of the back upright, the back tilt tension, and height adjustment of the back shall be of contemporary style design, easily accessible and easily operated. When the adjustment method is other than a handwheel, the adjusting device shall be securely attached to the underside of the seat and readily available for use. Provision shall be made to prevent the accidental removal of the back upright. The mechanism for the seat height adjustment shall be self-locking and positive height adjustment and nonbinding in revolving, raising, and lowering the seat over a range of not less than 2-1/4 inches which shall be accomplished manually without lifting the chair. The chair controls shall be properly lubricated. The chair controls shall incorporate a back tilting unit as specified in 3.2.5.4.5.

3.2.5.4.5 Back tilting unit, Type IV chairs. The back tilting unit shall provide the tension against the tilting of the chair back by means of springs, rubber torsion units, steel torsion rods or any other means having commercial acceptance that allows for variable tension. Tilting tension bolts shall be not less than 3/8 inch diameter and must be entirely supported by the chair control structure. The bolts shall have ample clearance through the entire tilting range to prevent breakage or wear by friction. The tilting action shall have a positive safety stop that will limit the tilting action during normal use and in case of failure or breakage of the tension unit. The range of tilting action shall be up to but not more than 17 degrees. Provision shall be made in the tilting mechanism to reduce the shock to the occupant when the chair back is tilted to the full extent of its range. All parts shall be finished as specified in 3.5 and the color shall be black.

3.2.5.4.6 Chassis, spider arms and spindle. The parts shall be securely assembled and designed to give rigid and properly balanced support between the chair seat and the base at all times. The entire assembly shall pass the off-center test specified in 4.5.6. The spindle shall be cold drawn steel one inch, plus 0.000 inch or minus .005 inch, in diameter and fitted to the chassis by a method which provides a secure, permanent attachment. The attachment of the spindle to the chassis shall comply with tests in 4.5.7. The chassis shall be designed to receive and give support to the spindle. The chassis shall extend a minimum of 3/4 inch along the spindle. The spider arm shall be formed to provide a structural web of not less than 1 inch and shall be designed to be rigidly secured to chair shell in not less than 4 places by bolts, nuts and lockwashers. The spindle shall be of sufficient length to provide for a minimum of 2-1/2 inches, plus or minus 1/4 inch of adjustment from the low position to the high position. The spindle shall be enclosed its full length when in the low position by a circular metal cover or base hub which may or may not be made to prevent the spindle from being accidentally removed from the base or from changing height positions. When in the height position, the cover or base hub shall be positioned so that not more than 1 inch of the spindle is visible. The chair shall be stable when the spindle is raised to the high position.

3.2.5.4.7 Replaceable "J" washers. The seat height adjustment control mechanism shall allow for the later insertion of plastic "J" washers which are designed either to open in order to fit over the spindle or which incorporate a removable metal part which performs as a key. The insertable "J" washers shall be obtainable by the chair users through the efforts of the chair manufacturer. Each chair shall have a label permanently affixed to the underside of the chair seat which states that, when needed, a replacement insertable "J" washer can be obtained by contacting the chair manufacturer for a source.

### 3.3 Design, dimensions.

3.3.1 Design. Figures 1 through 5 illustrate the general appearance and typical construction of the chairs and components. The figures are not intended to preclude similar chairs which are otherwise in accordance with the requirements of this specification. The chairs shall withstand the test specified in 4.5. The characteristics of each type of chair are as follows:

- Type I - Rotary chair, tilting seat and back, seat height adjustment, high back, equipped with casters, Style A with arms, upholstered seat and back (tufted).
- Type II - Rotary chair, tilting seat and back, seat height adjustment, standard (low) height of back, equipped with casters, Style A with arms and Style B without arms, upholstered seat and back (tufted).
- Type III - Rotary chair, nontilting seat and back, fixed seat height, equipped with glides, Style A with arms and Style B without arms. Upholstered seat and back (tufted).
- Type IV - Rotary chair, nontilting seat, tilting back, seat height adjustment, adjustable back, equipped with casters, Style B without arms, upholstered seat and back (tufted).

3.3.2 Dimensions. The dimensions of the chairs shall be as shown in Table II.

TABLE II. Dimensions  
All dimensions are in inches  $\frac{1}{4}$

	Type I		Type II		Type III		Type IV	
	Style A	Style B	Style A	Style B	Style A	Style B	Style A	Style B
A. Seat Depth	18 - 20							
B. Back Height	20-1/2 - 24							
C. Seat Height (No adjustment)	-							
Seat Height (Lowest adjust- ment setting)	17 - 18-1/4							
D. Overall Height (No adjustment)	-							
Overall Height (Lowest adjust- ment setting)	36 - 44							
E. Center to Center Caster or Glide Pintle	25 - 29							
F. Width between Arms	19-3/4 Min.							
G. Width of Seat Back (Max.)	-							
H. Height of Chair Back (Max.)	-							
I. Back (Max.)	-							

$\frac{1}{4}$  Points at which measurements are taken and illustrated in Figure 5.

3.4 Construction. The construction requirements specified herein are minimum. The contractor will exceed these requirements (without altering the general configuration, basic design concept, or primary construction specified or illustrated herein) wherever necessary to conform to the test provisions specified herein. Any detail not specified herein shall be consistent with good quality production of similar commercial products. All elements of construction shall be free of any conditions which hinder the proper function of any part of the chairs or which constitute a potential hazard to personnel or their clothing.

3.4.1 Assembly of metal parts. The assembly of metal parts shall be by welding or brazing as specified herein for maximum strength at each joint. Jigs shall be used to insure proper alignment of parts during welding. Welding and brazing shall be sound and without porosity and shall provide rigid chairs that have sufficient strength to withstand the applicable tests specified in 4.5, prohibit the loosening of any part; or shall not cause any other defect which might affect the service life of the chairs. Exposed welds shall be ground smooth to present a finished appearance. All overlapping parts which are to be welded to each other shall be positioned to provide maximum welding area, strength and rigidity to the welded assembly. Where specified, mechanical attachments shall provide secure and rigid joints in proper alignment. Where not otherwise specified, mechanical joints shall be made with cadmium or zinc plated steel rivets, bolts, nuts and lockwashers.

3.4.2 Brazing. Where brazing is permitted, the following conditions shall apply: When brazing is used to join component parts in lieu of welding, the brazing method shall include the use of a nickel-bronze rod conforming to Type I, Class RCuZn - D of QQ-R-571, and shall have a tensile strength of 70,000 p.s.i., or, alternatively, silver brazing with 45% silver content may be used in conjunction with an induction welding process. When brazing is used simply as a filler or a filler to hide a seam or joint that has been securely joined by welding, the brazing method may include the use of another rod having adequate tensile strength to assure the brazed area will not crack or fracture under shipping, moving or in-use conditions.

3.4.3 Base. The base shall be modern contemporary design and shall withstand the tests specified in 4.5. The base shall be constructed as specified in (a) or (b).

(a) The design of the base shall be generally rectangular in profile (see sectional views in Figures 1 through 4). The legs shall be made of tubing as specified in 3.2.1, or formed steel welded into a tube. The end of the leg shall be closed with a metal insert which is securely welded or induction welded and brazed to the leg with the joint ground smooth to eliminate a visible joint. The legs shall be securely welded to the hub and/or hub and spindle cover. All joints shall be finished to eliminate open joints. The base leg shall be sloped (from the point of attachment to the base hub to the end of the base leg) from a minimum of 1/4 inch to a maximum of 2-1/4 inches on the top surface, and from a minimum of no slope to a maximum of 1-1/4 inches at the bottom surface. When a self-lubricating plastic hub liner is used, it shall be supported its entire length (minus the thickness of the load bearing flange) by the steel hub. The steel hub shall be a minimum of 5 inches long and the plastic hub liner shall be a minimum of 3-7/8 inches long. Where a plastic liner is not used, the inside of the steel hub shall be properly lubricated. All outer surfaces of the base, including spindle cover and height adjustment handwheel shall be chromium plated in accordance with 3.6 and shall have a satin finish.

(b) The base shall be constructed of steel and shall be a slim-line "T" shape design, (see sectional views in Figures 1 through 4). The "T" shape legs shall be continuously welded (on both sides of each leg) to a center, circular hub. The leg-hub assembly shall be finished as specified in 3.5 in black color. Exposed spindle or bell-type height adjustment handwheel are not permitted in this design. The ends of the base legs shall have bumpers or toe caps of molded ABS plastic in black color. The top surface of the base or top of the "T" shape design shall be satin finished chromium plated extending from the top of the leg to the top of the center column (hub) and shall fit the contour of the base and be without gaps or loose edges. There shall be no rough edges on the base. The base shall have a center column with a commercial type insertable spindle housing with self-lubricating bearings which shall provide a continuous bearing surface for the spindle for not less than the entire height of the base less 3/4 inch maximum, or shall provide a bearing surface at the top of the spindle by means of a one inch nylon bearing and a one inch flanged thrust bearing at the bottom.

3.4.3.1 Caster and glide sockets. Caster sockets to accommodate the casters specified in 3.2.5.2 shall be provided in bases for all Type I, Type II, Type IV chairs. Sockets to accommodate the glides specified in 3.2.5.3 shall be provided in bases for all Type III chairs. The caster and glide sockets shall be accurately located to provide a true vertical position for the caster or glide and shall provide sufficient metal support at the end of the leg to insure secure caster or glide attachment at all times. The socket shall be securely welded or induction welded and brazed to the base when a caster or glide socket is used which also forms the outer end of the leg. The socket shall be metal and shall be securely joined to the base end by welding or induction welding and brazing. Alternatively, the socket may be an integral part of the base end insert.

#### 3.4.4 Shells.

3.4.4.1 Shells, Type I, II and III chairs. The chair seat and back shall consist of one inner and one outer, one-piece molded plastic shells. The two shells shall be molded to fit together around their perimeters, however, the inner shell molding shall be such as to provide space between the shells in back and seat areas to provide resiliency. The inner and outer shells shall be as specified in (a) or (b).

(a) The inner shell shall be molded or high impact rigid expanded polystyrene or alternatively, shall be molded of polyester reinforced with glass fiber mat and shall have a thickness of 0.075 inch minimum in the body of the shell. The minimum thickness of the perimeter of the inner shell at the radius shall be not less than 0.125 inch. Alternatively, the inner shell shall be molded of expanded polypropylene and reinforced (integrally or with added components) as necessary to comply with the applicable test in 4.5. The inner shell shall have provisions for tufting the padding and upholstery cover.

(b) The outer shell shall be molded of polypropylene plastic or high density polyethylene or shall be molded of polyester reinforced with glass fiber mat. The outer shell shall have a textured finish and the Type I shall have a minimum thickness of 0.130 inches and Types II and II a minimum thickness of 0.125 inch. The color of the outer plastic shell shall be black, or alternatively, shall be slate gray. The color of the polypropylene and polyethylene shells shall be incorporated into the outer shell at time of molding. When the shells are of polyester reinforced with glass fiber mat, the finish shall be a baked-on polyester finish applied in two coats. It shall have a total dry film thickness of not less than two mils. The polyester finish shall pass the finish test in 4.5.

3.4.4.1.1 Base fastening devices for Types I, II and III chairs. The fastening devices shall be molded into the inner shell or may be multipronged "T" nuts driven into the inner shell for attachment of the spider through the outer shell. Alternatively, the chair control spider shall be secured to the outer shell by weld bolts, welded to not less than a 16 gage steel plate (which is placed on the inner side of the outer shell) and extending through the outer shell at the rear and by another type of bolt extending through the inner and outer shells at the front. The spider of the control is then secured by applying nuts and lockwashers to the bolts. All other attachments of inner shell shall be concealed from view.

3.4.4.2 Shells - Type IV chairs. The chair seat and back shall consist of a separate molded plastic outer shell and an inner shell of plastic or plywood. The inner and outer shells shall be formed in such a manner that they will fit accurately around their perimeters. The inner and outer shells shall be as specified in (a) and (b).

(a) The inner shell shall be molded of high impact rigid expanded polystyrene, or alternatively, shall be molded of polyester reinforced with glass fiber mat and shall have a thickness of 0.125 inch minimum or alternatively, shall be minimum 5 ply plywood not less than 3/8 inch thick for the seat and 1/4 inch for the seat with edges rounded. Also, alternatively, the inner shell shall be molded or expanded polypropylene and reinforced integrally or with added components, as necessary to comply with the applicable test in 4.5. The inner shell shall have provision for tufting the padding and upholstery cover.

(b) The outer shell shall be molded of polypropylene plastic or a high density polyethylene or polyester reinforced with glass fiber mat. The outer shell shall have a textured finish and shall have a minimum thickness of 0.090 inch. The color and the method of its application to the outer shell shall be as specified in 3.4.4.1 (b).

3.4.4.2.1 Base fastening devices for Type IV chair. The chair control spider may be fastened to either the inner shell or the outer shell. The outer shell and inner shell shall be securely fastened to each other. All fastening devices shall be tight and secure. The fastening devices shall remain tight and secure through the conduct of the performance tests as specified in 4.5. The fastening devices shall not be visible from normal exterior view.

3.4.5 Arms.

3.4.5.1 Arms. Type I, II and III, Style A chairs. The arms shall be constructed of a metal frame which shall be either fitted with a molded plastic pad or the metal frame shall be molded into the plastic pad. When the metal frame is fitted to the plastic arm pad, the metal frame shall not be exposed to normal exterior view and shall attach to the arm pad by not less than two machine screws applied into two threaded inserts which are molded into the arm pads. The plastic material for the arm pad shall be phenolic, ABS, or self-shining urethane. Provisions shall be made in the metal frame for attachment of the arms to the inner shell. Alternatively, the arm maybe of solid molded ABS plastic with metal inserts for attachment to the inner shell. In either construction method, the attaching brackets shall not be visible when the chair is upholstered. The arms shall pass the applicable test in 4.5 and shall be black in color. The color shall be incorporated at time of molding.

3.4.6. Detail requirements (per Type and Style of chair).

3.4.6.1 Type I, Style A chairs. The Type I, Style A chairs shall be of the general design as shown in Figure 1 and shall be of the dimensions specified in Table II (3.3.2). The chair shall withstand the tests specified in 4.5.

3.4.6.1.1 Base. The base shall be as specified in 3.4.3 and equipped with casters as specified in 3.2.5.2.

3.4.6.1.2 Chair control. The chair control shall be as specified in 3.2.5.4.1.

3.4.6.1.3 Shells. The chair shells shall be as specified in 3.4.4.1.

3.4.6.1.4 Arms. The arms shall be as specified in 3.4.5.

3.4.6.1.5 Chassis, spider arms and spindle. The chassis, spider arms and spindle shall be as specified in 3.2.5.4.6.

3.4.6.1.6 Seat and back padding. The seat and back padding shall be as specified in (a) or (b).

(a) The inner shell shall have a seat pad of high density polyurethane specified in 3.2.2 not less than 2 inches thick. The back pad shall consist of 2 pieces of polyurethane foam. (The lower portion of the back shall be high density polyurethane as specified in 3.2.2, not less than 1-3/4 inches thick and the upper portion of the back shall be low density polyurethane foam as specified in 3.2.2 not less than 1-1/2 inches thick.) A minimum of one layer of 1-1/4 ounce per square foot polyester batting shall be placed completely over the surface of the polyurethane seat and back pad. A spunbonded polypropylene sheet fabric (Tyvec) or natural (Burlap) insulator shall be securely bonded to the inner shell to prevent the padding from flowing through the vent holes in the inner and outer shell.

(b) The back and top portion of the seat and back padding shall be a one piece unit of low density polyurethane specified in 3.2.2. The bottom insert of the seat shall be of high density polyurethane specified in 3.2.2 and shall be securely cemented to the bottom of the top unit to form a single unit. The polyurethane cushion shall be securely bonded to the inner shell and shall be applied in a manner that will prevent the urethane or other padding from flowing through the vent holes in the inner shell. The polyurethane cushion shall be sufficiently thick to produce a finished seat of approximately 2 inches, a padding in the lumbar support region of approximately 11/16 inch and the back of approximately 1 inch.

3.4.6.1.7 Upholstery cover and shell attachment. The upholstery cover shall be of the fabric specified in 3.2.3 and the upholstery cover and shell attachment shall be in accordance with (a) or (b). Regardless of the method used, buttons with the same fabric cover as the upholstery cover shall be tied through the upholstery cover and padding and through suitable apertures in the inner shell. The button cord shall be securely held at the back of the inner shell so that they cannot pull out. There shall be no less than four buttons in the seat and no less than two buttons in the lower back and two buttons in the upper back. The buttons shall be placed in a manner which is compatible with the contour of the shell. Regardless of the methods used for attachment of the inner and outer shells,

the inner shell shall be capable of being removed from the outer shell being reupholstered and being reattached to the outer shell.

(a) The upholstery fabric shall be in three pieces with a seam at the joining of the seat and back and another seam at a point approximately one-half of the distance between the seat and the top of the back. There shall be sufficient internal structure to hold the seat taut to prevent the upholstery cover from slipping. The upholstery fabric shall be turned under and stapled around the entire perimeter of the inner shell. Alternatively, the upholstery fabric shall be turned around the entire perimeter of the inner shell by a steel wire or spring-up twin (flax cord) in a taut manner. The entire perimeter of the outer shell shall be covered with a bumper strip of impact resistant flexible polyvinyl chloride (or impact resistant flexible vinyl of another type), which shall be secured to the outer shell by use of concealed screws or staples. The bumper strip shall be of sufficient hardness and thickness to prevent the attaching devices from telegraphing through the material. The color of the bumper strip shall be black. The outer shell and upholstered inner shell shall be securely held together by means of screws or staples concealed under the bumper strip on the outer shell and/or by the mounts of the chair control spider. When staples are used to secure the two shells, the staples shall have a 5/16 inch (minimum) crown and 5/8 inch (minimum) legs.

(b) The upholstery fabric shall be in two pieces with the seam near the perimeter edge to provide a smooth fit. There shall be sufficient internal structure or other means to hold the upholstery cover down to the padding and prevent it from slipping. The upholstery fabric shall be neatly and without wrinkles turned under the entire perimeter of the inner shell and securely stapled or bonded with a suitable adhesive so that it will not pull out. The entire perimeter edge of the outer shell shall be covered with a bumper strip of impact resistant flexible polyvinyl chloride (or impact resistant flexible vinyl of another type), which shall be secured to the outer shell, by use of concealed screws or staples. The bumper strip shall be of sufficient hardness and thickness to prevent the attaching devices from telegraphing through the material. The color of the bumper strip shall be black. The outer shell and the inner shell shall be securely held together by means of screws or staples concealed under the bumper and/or bolts which are secured to inserts in the inner shell. Four of the bolts shall mount the chair control spider and none of the bolts shall be visible on the chair back. When staples are used to secure the two shells, the staples shall have a 5/16 inch (minimum) crown and 5/8 inch (minimum) legs.

3.4.6.2 Type II, Style A chair. The Type II, Style A chair shall be of the general design as shown in Figure 2 and shall be of the dimensions as shown in Table II (3.3.2). The chair shall withstand the tests specified in 4.5.

3.4.6.2.1 Base. The base shall be as specified in 3.4.3 and shall be equipped with casters as specified in 3.2.5.2.

3.4.6.2.2 Chair controls. The chair controls shall be as specified in 3.2.5.4.1.

3.4.6.2.3 Shells. The chair shells shall be as specified in 3.4.4.1.

3.4.6.2.4 Arms. The arms shall be as specified in 3.4.5.

3.4.6.2.5 Chassis, spider, arms and spindle. The chassis, spider arms and spindle shall be as specified in 3.2.5.4.6.

3.4.6.2.6 Seat and back padding. The seat and back padding shall be as specified in (a) or (b).

(a) The seat and back padding shall be as specified in 3.4.6.1.6 (a). Alternative to the use of a two piece back pad, the back pad may be a one piece layer, not less than two inches thick of medium density polyurethane as specified in 3.2.2.

(b) The seat and back padding shall be as specified in 3.4.6.1.6 (b).

3.4.6.2.7 Upholstery cover and shell attachment. The upholstery cover shall be of the fabric specified in 3.2.3 and the upholstery cover and the shell attachment shall be in accordance with (a) or (b). Regardless of the method used, buttons with the same fabric cover as the upholstery cover shall be tied through the upholstery cover and padding and through suitable apertures in the inner shell. The button cord shall be securely held at the back of the inner shell so they cannot pull out. There shall be no less than 4 buttons in both the seat and the back. The buttons shall be placed in a manner which is compatible with the contour of the shell. Regardless of the method used for attachment of the inner and outer shells, the inner shell shall be capable of being removed from the outer shell, being reupholstered and being reattached to the outer shell.

(a) The upholstery fabric shall be as specified in 3.4.6.1.7 (a) with the exception that the cover shall be in two pieces with the seam joining the seat and back.

(b) The upholstery fabric shall be as specified in 3.4.6.1.7 (b).

3.4.6.3 Type II, Style B chair. The Type II, Style B chair shall be of the general design as shown in Figure 2 and shall be of the dimensions as shown in Table II (3.3.2). The chair shall withstand the tests specified in 4.5.

3.4.6.3.1 Base. The base shall be as specified in 3.4.3 and shall be equipped with casters as specified in 3.2.5.2.

3.4.6.3.2 Chair controls. The chair controls shall be as specified in 3.2.5.4.1.

3.4.6.3.3 Shells. The chair shall be as specified in 3.4.4.1.

3.4.6.3.4 Chassis, spider arms and spindle. The chassis, spider arms and spindle shall be as specified in 3.2.5.4.6.

3.4.6.3.5 Seat and back padding. The seat and back padding shall be as specified in 3.4.6.2.6.

3.4.6.3.6 Upholstery cover and shell attachment. The upholstery cover and shell attachment shall be as specified in 3.4.6.2.7.

3.4.6.4 Type III, Style A chair. The Type III, Style A chair shall be of the general design as shown in Figure 3 and shall be of the dimensions as shown in Table II (3.3.2). The chair shall withstand the tests specified in 4.5.

3.4.6.4.1 Base. The base shall be as specified in 3.4.3 and shall be equipped with glides as specified in 3.2.5.3.

3.4.6.4.2 Chair controls. The chair controls shall be as specified in 3.2.5.4.2.

3.4.6.4.3 Shells. The chair shells shall be as specified in 3.4.4.1.

3.4.6.4.4 Chassis, spider arms and spindle. The chassis, spider arms and spindle shall be as specified in 3.2.5.4.6 except that the spindle shall be the fixed height type.

3.4.6.4.5 Arms. The arms shall be as specified in 3.4.5.

3.4.6.4.6 Seat and back padding. The seat and back padding shall be as specified in 3.4.6.2.6.

3.4.6.4.7 Upholstery cover and shell attachment. The upholstery cover and shell attachment shall be as specified in 3.4.6.2.7.

3.4.6.5 Type III, Style B chair. The Type III, Style B chair shall be of the general design as shown in Figure 3 and shall be of the dimensions as shown in Table II (3.3.2). The chair shall withstand the tests specified in 4.5.

3.4.6.5.1 Base. The base shall be as specified in 3.4.3 and shall be equipped with glides as specified in 3.2.5.3.

3.4.6.5.2 Chair controls. The chair controls shall be as specified in 3.2.5.4.2.

3.4.6.5.3 Shells. The chair shells shall be as specified in 3.4.4.1.

3.4.6.5.4 Chassis, spider arms and spindle. The chassis, spider arms and spindle shall be as specified in 3.2.5.4.6 except that the spindle shall be the fixed height type.

3.4.6.5.5 Seat and back padding. The seat and back padding shall be as specified in 3.4.6.2.6.

3.4.6.5.6 Upholstery cover and shell attachment. The upholstery cover and shell attachment shall be as specified in 3.4.6.2.7.

3.4.6.6 Type IV, Style B chair. The Type IV, Style B chair shall be of the general design as shown in Figure 4 and shall be of the dimensions as shown in Table II (3.3.2). The chair shall withstand the tests specified in 4.5.

3.4.6.6.1 Base. The base shall be as specified in 3.4.3 and shall be equipped with casters as specified in 3.2.5.2.

3.4.6.6.2 Chair controls. The chair controls shall be as specified in 3.2.5.4.4.

3.4.6.6.3 Back tilting unit. The back tilting unit shall be as specified in 3.2.5.4.5.

3.4.6.6.4 Shells. The chair shells shall be as specified in 3.4.4.2.

3.4.6.6.5 Chassis, spider arms and spindle. The chassis, spider arms and spindle shall be as specified in 3.2.5.4.6.

3.4.6.6.6 Back upright. The back upright shall be single column design conforming to Figure 4 and shall be a minimum width of 2 inches and a maximum of 2-3/4 inches. The back upright shall be steel satin finish chromium plated in accordance with 3.6. Alternatively, the back upright may consist of two bars of steel not less than 1/4 inch by 3/4 inches separated by brackets approximately 7/8 inch wide to form a single column. The two steel bars shall be satin finish chromium plated in accordance with 3.6. The separating brackets may be finished as specified in 3.5 in black color. The back upright shall provide for adjustment in the vertical plane a minimum of 2 inches. Provision shall be made for the adjustment of the back upright of not less than 1-1/4 inches nor more than 2-1/2 inches in the horizontal (front to rear) plane. Provision shall be made to prevent accidental removal of the upright from the chair control. Provision shall be made for the secure attachment of the back rest by means of internal attachment or by not more than two pivotal brackets in the chair back. When pivotal brackets are used, the mechanism shall not have any exposed screws, nuts or bolts.

3.4.6.6.7 Seat and back padding. The seat shall have a cushion of high density polyurethane as specified in 3.2.2 and not less than 1 inch thick. The polyurethane cushion shall be securely attached to the inner shell in such a manner that the cushion does not flow through the vent holes in the inner and outer shell. Alternatively, the high density polyurethane cushion shall have a layer of polyester batten not less than 1/2 inch thick covering its entire surface. A spunbonded polyurethane fabric (Tryvec) or natural (Burlap) insulator shall be bonded to the inner shell to prevent the polyurethane cushion from flowing through the vent holes in the inner and outer shells. A back pad of polyurethane as specified in 3.2.2 not less than 1-1/2 inches thick shall be securely bonded to the back inner shell.

3.4.6.6.8 Seat upholstery cover and shell attachment. The upholstery cover shall be of the fabric specified in 3.2.3. The upholstery fabric for the seat cover shall be in one piece and shall be turned under and stapled around the entire perimeter of the inner shell. Buttons of the same fabric as the upholstery cover shall be tied through the upholstery cover and padding and through suitable apertures in the inner shell. The button cord shall be securely held at the back of the inner shell so that they cannot pull out. There shall be not less than 4 buttons in the seat, positioned in manner which is compatible with the contour of the seat. The entire perimeter of the outer shell shall be covered with a bumper strip of impact resistant flexible polyvinyl chloride (or impact resistant flexible vinyl of another type) which shall be permanently secured to the outer shell by use of concealed screws or staples. The bumper strip shall be of sufficient hardness and thickness to prevent the attaching devices from telegraphing through the material. The color of the bumper strip shall be black. The outer shell and the upholstered inner shell shall be securely held together by means of screws or staples concealed under the bumper strip on the outer shell and/or by the mounts of the chair control spider. When staples are used to secure the two shells, the staples shall have a 5/16 inch (minimum) crown and 5/8 inch (minimum) legs. Regardless of the method of attachment used, the inner shell shall be capable of being removed from the outer shell, being reupholstered and being reattached to the other shell. The seat cover shall be completely filled with the seat core and there shall be no bumps or other unattractive features of tailoring.

3.4.6.6.9 Back upholstery cover and shell attachment. The upholstery cover shall be of the fabric specified in 3.2.3. The upholstery fabric for the back cover shall be in one piece and shall be turned under and stapled around the entire perimeter of the inner shell. Buttons of the same fabric as the upholstery cover shall be tied through the upholstery cover and padding and through suitable apertures in the inner shell. The button cord shall be securely held at the back of the inner shell so that they cannot pull out. There shall be not less than 2 equally spaced buttons on the back. The entire perimeter of the outer shell shall be covered with a bumper strip of the material, hardness, color and method of attachment specified in 3.4.6.6.8. The outer shell and the upholstered inner shell shall be securely held together by clips, screws, or brackets. (The only attachment that will be visible on the exposed outer shell shall be when the pivot back is furnished.) The back cover shall be completely filled with the back core and there shall be no bumps, lumps or other unattractive features of tailoring. Regardless of the method used to attach the inner shell and the outer shell

the inner shell shall be capable of being removed from the outer shell, being reupholstered, and being reattached to the outer shell.

### 3.5 Pretreatment and finishing.

3.5.1 Pretreatment. All unplated ferrous metal surfaces, (except the spindle), shall be treated for painting in accordance with the manufacturers' commercial practice.

3.5.2 Finishing. All pretreated ferrous metal surfaces shall be coated with enamel specified in 3.2.4.1.2. The color shall be black. The finish shall level out to a smooth, uniform surface. There shall be no areas of thin film metal showing through the finish, no film and separation of color.

### 3.6 Pretreatment and finishing, plated finish.

3.6.1 Pretreatment. The components to be plated shall be cleaned and otherwise pretreated in accordance with the standard commercial practice for the type of plating specified.

3.6.2 Chromium plating. All chromium plating shall be class 1 (decorative) of QQ-C-320. Also, the chrome plating shall be Type II (satin finish) as specified herein. The undercoat used shall be copper plus nickel conforming to Type III (KS) on steel base metal - 0.00075 inch of copper plus nickel as specified in QQ-N-290. Nickel alone may be used for the undercoat provided it is at least 0.0005 inch thick. The exposed surfaces of the chromium shall visually match Government sample number FSS-M-01001 (see 6.4). The chromium plating shall not peel, chip or crack and it shall be free of uneven color, pits, blisters, stains, powder film, and brush or grind marks. It shall comply with the test specified in 4.5.9.

3.7 Identification label. The identification labels shall be metal foil, adhesive backed, pressure sensitive, conforming to Type I of MIL-P-19834. It shall be marked with the contractors name or trade-mark, contract or order number, item stock number and year of manufacture. The plate size shall be 1-1/4 inch high, plus or minus 1/4 inch, by 2-1/4 inch long, plus or minus 1/4 inch.

3.8 Workmanship. A high degree of craftsmanship shall be exercised while performing the various operations of manufacture to eliminate burrs and sharp edges; to assure that the occurrence of defects will not exceed the acceptable quality level specified herein; and to produce a finished commodity that is satisfactory in function, serviceability and appearance.

3.9 Printed adjustment instructions. Each chair shall have a printed tag which clearly shows each adjustment point of the chair and how adjustment is affected. The tag shall be attached to part of the chair's adjustment mechanism. The printing shall be clear and permanent.

## 4. QUALITY ASSURANCE PROVISIONS

4.1 Inspection responsibility. The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified (see 6.2), the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Component and material inspection. In accordance with 4.1 above, the supplier is responsible for insuring that end item components and materials, and packing and packaging materials used are manufactured, tested and inspected in accordance with the requirements of referenced subsidiary specifications and standards to the extent specified and in accordance with this specification.

4.2 Lot acceptance tests. Lot acceptance tests shall be conducted under the supervision of the Government Inspector at the manufacturer's plant. In the event the manufacturer does not have the facilities to perform the required tests, he shall engage the services of a commercial testing laboratory acceptable to the Government. Copies of the laboratory report shall be submitted to the Government Inspector upon receipt from the laboratory. All examination and testing shall be in accordance with Section 4 of this specification.

4.3 Sampling for inspection and acceptance. Sampling for inspection and acceptance shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated.

4.4 Inspection (end item).

4.4.1 Visual examination. Examination of the end item(s) shall be in accordance with the classification of defects specified in Table III and acceptable quality levels (AQLs) specified in 4.4.3. The lot size shall be expressed in the number of completed units for the purpose of determining the sample size in accordance with MIL-STD-105. The sample unit for this examination shall be one complete chair.

NOTE: Only one of the defects in brackets shall be scored for each unit of product examine.

TABLE III. Classification of defects

Examine	Defect	Classification Major/Minor
Enamel finish	Color separation, or not smooth and uniform. )	X
	Area of thin coating. )	
	Wrong color. )	
	Scratch through to base metal, or bare spot. )	
Metallic coating	Rust under coating. )	X
	Wrong type. )	X
Workmanship and Construction	Shows evidence of peeling, chipping, or cracking. )	X
	Any part missing, except bolts, nuts and lockwashers. )	
	Malformed parts affecting serviceability. )	
	Broken, punctured or cracked parts. )	
	Sharp edges of projections. )	
	Malformed, damaged or warped parts affecting appearance. )	
Welds	Components not of specified material. )	X
	Finish has pits, blisters, stain, or powdered film. )	X
	Does not visually match G.S.A standard sample (excessive brush or grind marks, finish too bright or uneven color). )	
	Welding and brazing not as specified. )	
Burnt through, cracked, fractured or not fused. )		
Upholstery material	More than one spot weld missing at any one joint. )	X
	Not material specified. )	X
	Faded or shade variations affecting appearance. )	X
Padding	Upholstery not securely attached. )	X
	All edges not turned in. )	
Casters	Not smooth fit. )	X
	Not thickness specified. )	
Molded plastic shell	Not type specified. )	X
	Missing. )	
	Not material specified. )	
	Not thickness specified. )	
Base	Rough or sharp edges. )	X
	Not uniform in color. )	
	Not finished as specified. )	X
Chair controls	Caster sockets not properly located. )	X
	Adjustment range less than 2-1/4 inches. )	X
	Seat height adjustments not self-locking. )	X
	Seat height changes when chair revolves. )	
	Tilting unit not provided with positive safety stop. )	X
Tilting unit not as specified. )	X	
Identification marking	Missing. )	X
	Wrong location. )	

4.4.2 Dimensional examination. Inspection will be made of chairs for compliance with dimensions specified. Any dimension not within tolerance specified shall be classified as a minor defect. The points at which the dimensions are to be taken are as set forth in Figure 5.

4.4.3 Inspection levels and AQL's. The acceptable quality levels (AQL's) expressed in defects per hundred units and inspection levels shall be as follows:

	<u>Inspection levels</u>	<u>AQL's</u>
For examination in Table III Major	II	4.0
For examination in Table III Total	II	10.0
For examination in 4.4.2 (1 class)		4.0

4.4 Examination of preparation for delivery requirements. An examination shall be made to determine that the packaging, packing and marking comply with PPP-P-1875.

4.5 Tests (end item.) Tests shall be performed as described herein on each complete type and style of chair being produced under the contract to assure continuous quality production. Tests shall be performed on the production samples submitted for inspection and at other times at the discretion of the Government (see 4.1). Paragraphs 4.5.1 through 4.5.6 specify examples of test methods and equipment that may be used for applying specific loads to the chairs but do not preclude the use of other test fixtures if the mechanics of the load systems are duplicated for similar tests. Points of reference lines shall be provided on appropriate parts of the chair so that accurate measurements may be taken with allowance made for permitted slack in chair control to determine if any permanent distortion has taken place under test. If the chair (see 3.1.1) which is subjected to the performance testing complies with all the end item test requirements, it shall then be stripped of its upholstery and thoroughly examined. Any cracks or fractures in the inner or outer shells or any loosening of fastening devices shall be cause for rejection.

4.5.1 Drop test, for all types of chairs (Figures 6 and 6A). Chairs with height adjustment shall have the seat height set at 1-1/2 inches above the minimum adjustment. Casters or glides shall be removed. Two adjacent arms of the base shall be secured to prevent movement during the test. A reference line shall be established from the underside of the seat at front center to the testing platform. The dimension shall be recorded. A bag of sand not more than 16 inches in diameter, weighted with 275 pounds of sand for Type I, II and III, chairs and 200 pounds of sand for Type IV chairs shall be dropped once onto the center of the seat from a height of 6 inches. Dimension or reference lines shall be taken. Permanent distortion shall not exceed 1/4 inch. Damage to plastic shell, base or attachments shall also be reason for rejection.

4.5.2 Back pull testing for Type I, II and III chairs (Figure 7). Casters shall be removed and seat height set at midpoint. The chair shall be secured to the platform in an upright position by means of clamps on the base arms and shall be restrained from movement. A spring dynamometer or equally effective device shall be attached to a yoke or clamp and fastened to the center top of the chair back. A back pull of 250 pounds shall be applied normal to the slope of the back. The load shall be maintained for not less than 3 minutes. The slope shall be determined when the back has reached the maximum limit of travel. After the test load has been removed, the chair shall be thoroughly examined visually to assure absence of the following defects:

- (a) There shall be no cracks or fractures in the outer shell.
- (b) There shall be no loosening of inner shell from outer shell.
- (c) The chair control shall function properly.
- (d) Attachment of chair control to chair shall remain tight and secure.
- (e) There shall be no loosening of arm attachment to chair.

4.5.2.1 Back pull test for Type IV chairs (Figure 8). With casters removed, restrain the base of the chair from movement. The seat height shall be set 1-1/2 inches above the minimum seat height adjustment and the back height and horizontal adjustment shall be set at the medium position. A spring dynamometer or an equally effective device shall be attached to a yoke fastened to the center of the back rest, and a back pull shall be applied normal to the slope of the back at all times and up to the maximum limit of travel. The chair shall withstand and load test of 150 pounds for a period of 3 minutes without a permanent distortion of more than 1/4 inch. Measurements for determining distortion shall be taken on a horizontal line from point of attachment before and after the application of the test load with the chair back in its normal upright position.

4.5.3 Base test, static load, for all types of chairs (Figure 9). The casters or glides shall be removed and the base shall be placed in an upright position, supported with steel blocks only at the center or glide points of contact. A static load of not less than 2,500 pounds, concentrated over an area of 1-3/4 inches in diameter at the center of the base, shall be applied at the rate of 1/8 inch per minute. The base shall withstand the test without any permanent distortions exceeding 0.062 inch, fractures, interior breakage or exterior breakage.

4.5.4 Arm tests for all Style A chairs (Figure 10). Casters or glides shall be removed. The chair shall be clamped to the testing platform in an upright position. The seat and back (but not the arm) shall be restrained from movement. The following test shall be performed.

4.5.4.1 Arm deflection test. A horizontal pull of 40 pounds shall be applied outward to one of the arms. The pull shall be applied to the arm rest within 1 inch of the vertical upright of the arm. The deflection of the arm under load shall not exceed 5/16 inches. If the arm passes, the test shall be repeated on the opposite arm.

4.5.4.2 Arm attachment test. A horizontal pull of 175 pounds shall be applied outward to one of the arms. The pull shall be applied to the arm rest within 1 inch of the vertical upright position of the arm. Permanent distortion of the arm shall not exceed 1/4 inch after the force has been applied and released. Damage to the plastic shell or attachment shall also be reason for rejection. If the arm passes, the test shall be repeated on the opposite arm.

4.5.5 Durability test for base with casters for Type I, II and IV chairs. A chair with casters mounted shall be placed on the obstacle layout as indicated in Figure 11. A 300 pound load shall be applied (as indicated in Figure 11) with the spindle fully extended. The base shall be attached to a mechanical device which will exert a horizontal push and pull of from 30 inches to 34 inches as illustrated in the Figure. The machine will operate continuously at a rate of 8 to 10 cycles per minute with a maximum speed of 50 feet per minute. One cycle consists of a forward and backward stroke of the mechanical device. The base will be cycled for 36,000 cycles. Any structural breakdown or loss of serviceability in the base, caster socket or casters shall be considered cause for rejection of the lot.

4.5.6 Off-center test for chair support assembly for all types of chairs (Figure 12). Each chair control mechanism with spindle attached shall be secured to a testing platform. The spindle shall be clamped 6 inches above minimum height. A loading frame shall be attached to the spider. A vertical force of 680 pounds concentrated over an area of 1 inch shall be applied at a rate of 1/8 inch per minute onto the center of the loading frame six inches forward of the centerline of the spindle. The chair support assembly shall withstand the loading with no mechanical or material failure of any part of the assembly and a maximum allowable permanent distortion of 1/8 inch as measured from the point of application of the load.

4.5.7 Spindle attachment test. The spider, chassis and spindle shall be detached from the chair. The spider shall be secured and prevented from movement. The spindle shall remain unmoved after a force of 100 foot pounds is exerted to turn or displace the spindle by use of a tool, such as a wrench.

4.5.8 Test for upholstery fabric. The upholstery fabric shall be tested in accordance with the requirements of 3.2.3 and any failure to comply with the requirements when tested in accordance with the test methods cited shall be reason for rejection.

4.5.9 Chromium plating test. Test samples shall be plated as specified in 3.6.2 and shall be tested for corrosion in accordance with the 5 percent salt spray at 95 degrees F. in accordance with ASTM Test Method B 117. The test period shall be not less than 48 hours. After the specified exposure is complete, the test specimen shall be visually examined to assure that the plating shows no evidence of peel, chip, uneven color, powder film, pits or stains. Widely scattered spots of corrosion are permitted, however, none of the spots of corrosion shall exceed 1/16 inch along the greatest dimension.

4.5.10 Bend test for steel sheets. The steel sheets used for parts to be formed shall withstand a 180 degree bend at room temperature, with and across the grain, over a radius not exceeding the thickness of the test sample, without showing any crystallization, cracks or fractures on the outside of the bend.

4.5.11 Swivel cycling test for all rotary base chairs (Figure 13). The base of the entire chair shall be clamped to a rotating platform. A 225 pound load shall be secured on the seat two inches forward of the center line of the spindle as shown in Figure 13. The base shall be rotated a complete 360 degrees cycle for 120,000 revolutions at a rate of 10 to 16 revolutions per minute. Any evidence of structural failures at any point in the test causes rejection. After the completion of the 120,000 cycles, the chair shall be examined. Failure of the chair to swivel without dragging or binding is cause for rejection.

4.5.12 Seating impact test for all type chairs. The chair shall be secured to a test platform. Chairs with adjustable features shall have all adjustments set at normal use conditions or mid-point of adjustment. Chairs with casters shall have casters perpendicular to base legs. A cycling machine shall drop a 125 pound weight not more than 16 inches in diameter from a height of two inches above the seat onto the center of the seat. The drop shall be cycled for 100,000 cycles at a speed of 20 cycles per minute. Any evidence of structural failure in any of the materials, cracked or broken welds, broken casters, casters forced out of square with base more than 1/4 inch, or damage to height adjustment mechanisms shall be cause for rejection.

4.5.13 Tilting mechanism back stop and durability test. The test shall be performed on all rotary base chairs. The test may be performed on the entire chair or alternatively, on the chair without the upholstery. The chair shall be secured to a test platform with casters removed. The chair controls shall be set at normal use conditioned or at mid-point. A cycling device shall be attached 1 inch above the vertical center of the chair back. The cycling device shall push or pull the chair back from the at-rest position to the full extent of its tilt range and apply an additional force of 100 pounds at the limit of the tilt range and then allow the back to return to the at-rest position. This cycle shall be repeated 120,000 times at 40 cycles per minute maximum. The push or pull shall be normal to the plane of the back at rest. A weight of 100 pounds shall be secured to the center of the chair seat as the test is performed. After completion of the cycles, any structural breakage or loss of serviceability or failure of any part of the chair that would cause personal injury to the occupant shall be cause for rejection.

4.5.14 Adhesion test. When the outer shell is of polyester reinforced with glass fiber, the baked on polyester finish shall be subjected to the following adhesion test. A sample of the outer shell shall be prepared as specified in 3.4.4.1 (b). The sample shall be scored through the finish to the fiber glass with a razor blade in such a manner as to produce a grid of a minimum of 100 one-sixteenth inch squares. The dried film shall not be removed from the sample when a 1 inch wide piece of cellophane tape (Scotch Brand No. 600 or equal) is applied firmly to the grid surface (full length of panel) and then is quickly pulled from the surface.

4.5.15 Measurement of excessive play-wobble between chair seat and base. After the completion of all the tests in this section, but before the chair is taken apart, the chair shall be checked for excessive wobble between the base and control mechanism. The casters or glides shall be removed and the chairs shall be secured to a level surface plate with the seat height and control adjustments set at a maximum height. A weight of 15 pounds shall be suspended from the center right side edge of the chair seat. Measurements shall be taken from the level surface plate to the pre-established referenced points on the front-to-rear center of both sides of the seat. The weight shall then be suspended from the opposite side and the measurements retaken. The chair seat shall then be rotated 90 degrees and the entire set of measurements retaken. The difference between each set of left side and right side dimensions shall be calculated and the differences averaged. This average shall not exceed 3/16 inch.

## 5. PREPARATION FOR DELIVERY.

5.1 Packaging, packing and marking. Packaging, packing and marking shall be in accordance with PPP-P-1875. The level of packaging shall be A or C as specified (see 6.2). The level of packing shall be level A, B or C as specified (see 6.2). The marking shall be civil or military as specified (see 6.2).

## 6. NOTES.

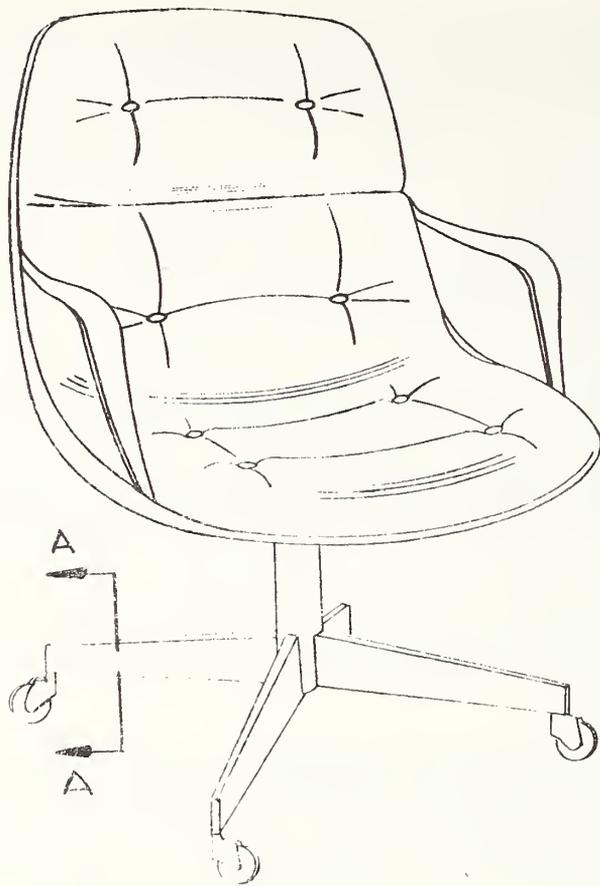
6.1 Intended use. The specification covers chairs suitable for use at desks and in conference rooms. They are modern in design and provide quality and comfort.

6.2 Ordering data. Purchasers should select the preferred options permitted herein; and include the following information in procurement documents:

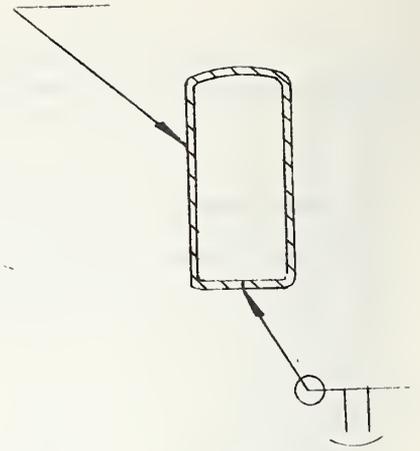
- (a) Title, number and date of this specification.
- (b) Type and Style of chair required (see 1.2.1).
- (c) When preproduction sample is not required (see 3.1).
- (d) Color of upholstery fabric desired (see 3.2.3.1).
- (e) Identification marking required (see 3.7).
- (f) When specific test facilities and services are required (see 4.1).
- (g) Levels of packaging and packing (see 5.1).
- (h) Civil or military marking (see 5.1).

6.3 The range of travel of the tilting mechanism is determined by taking a measurement of the angle at which the back rests when chair is unoccupied and by tilting the chair back rearward for the full extent of travel and taking a measurement.

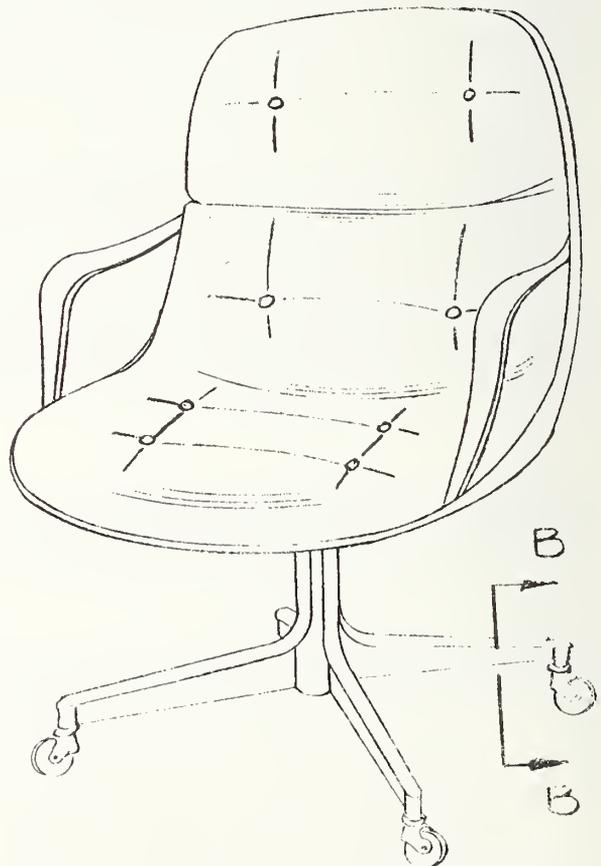
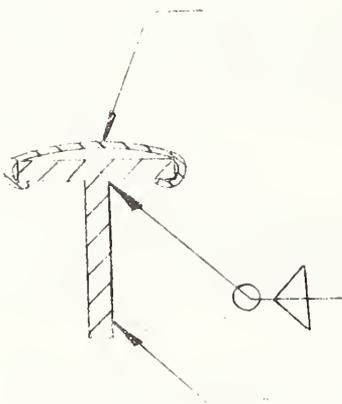
6.4 Standard samples. Samples of the standard colors of upholstery fabric and satin chrome finish are obtainable from the Technical Support Branch, National Furniture Center, Federal Supply Service, General Services Administration, Washington, DC 20406.



Type I, Style A

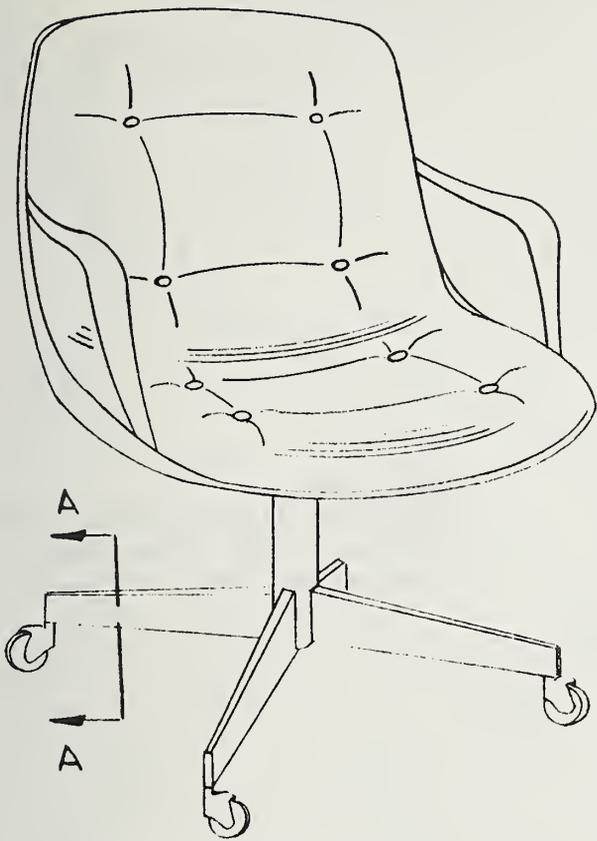


Base note:  
 Either of the two basic base  
 designs shown hereon are  
 acceptable (see 3.4.3).

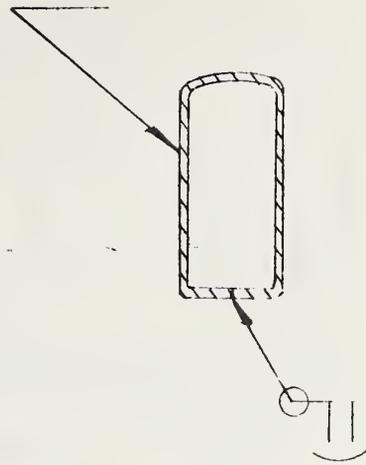


Type I, Style A

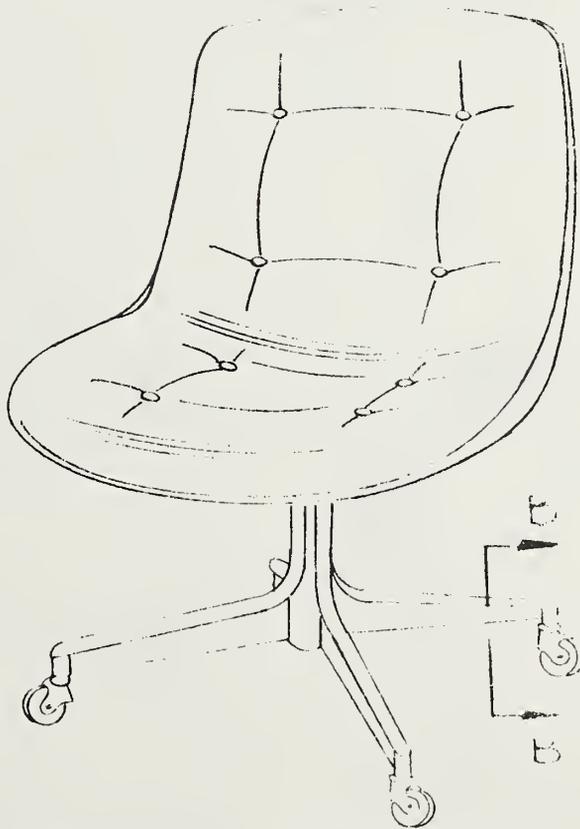
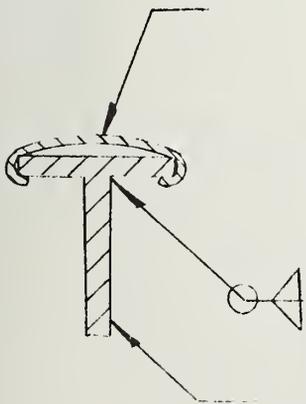
FIGURE 1



Type II, Style A

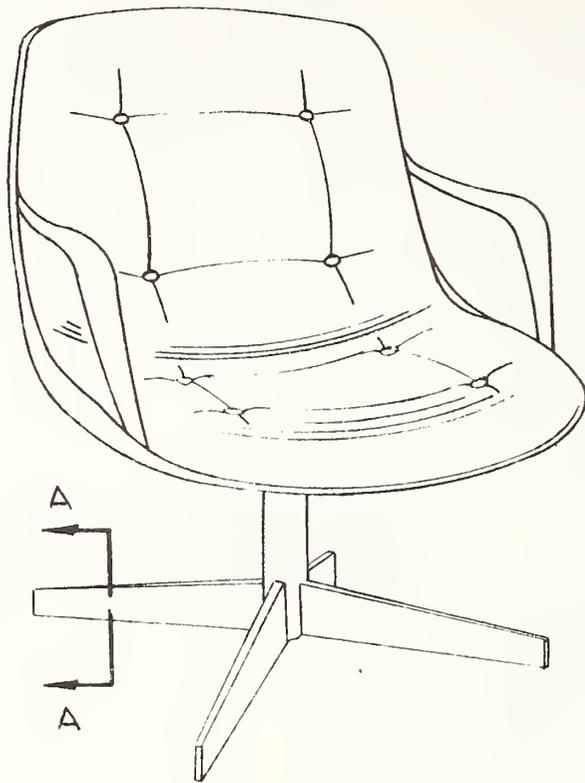


Base note:  
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 designs shown hereon are  
 acceptable (see 3.4.3).

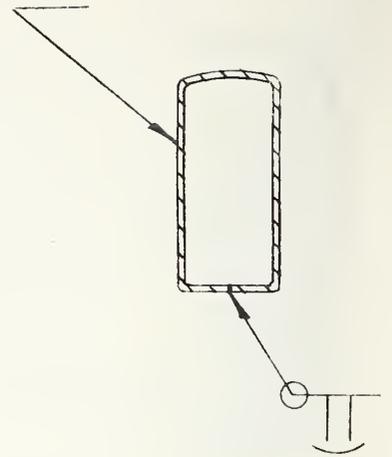


Type II, Style B

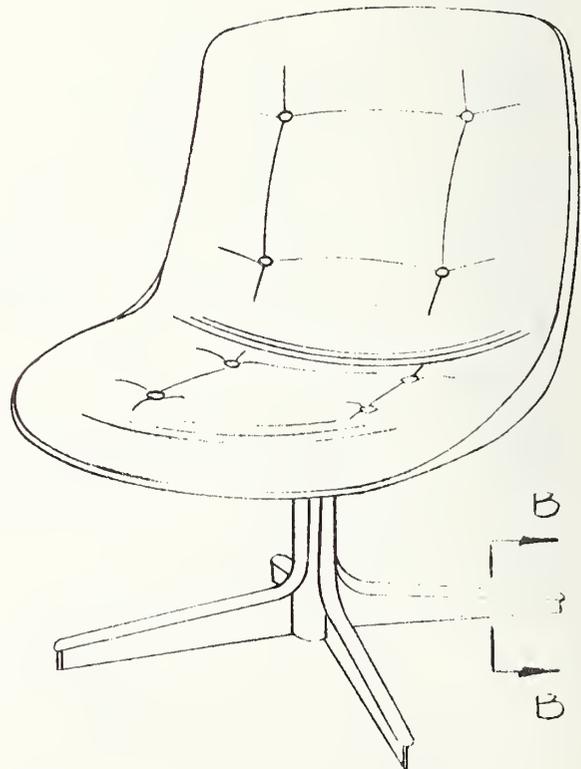
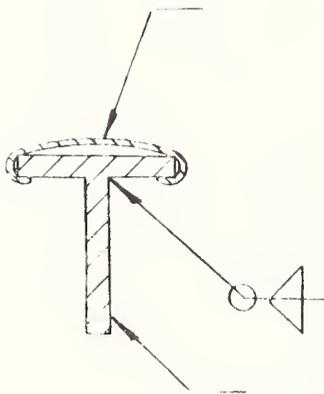
Figure 2



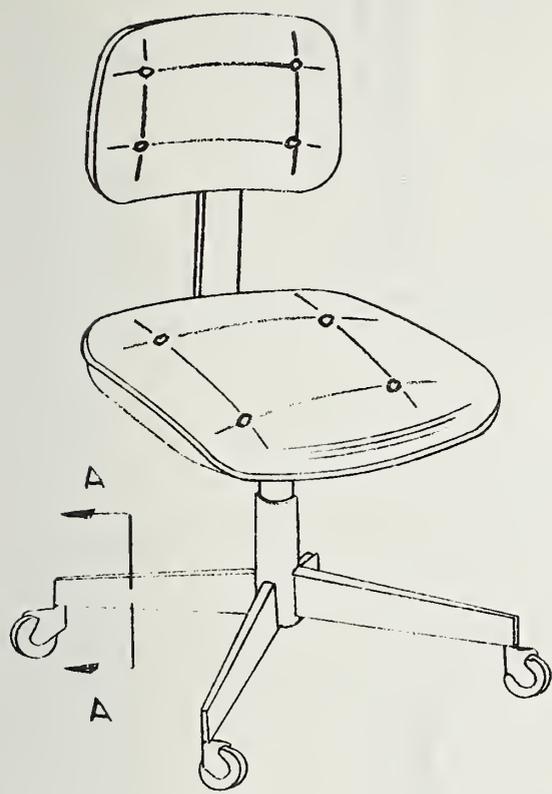
Type III, Style A



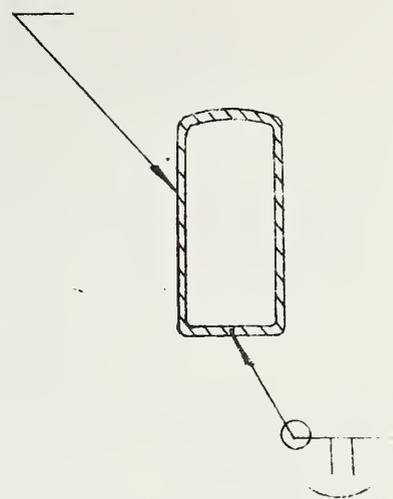
Base note:  
Either of the two basic base  
designs shown hereon are  
acceptable (see 3.4.3).



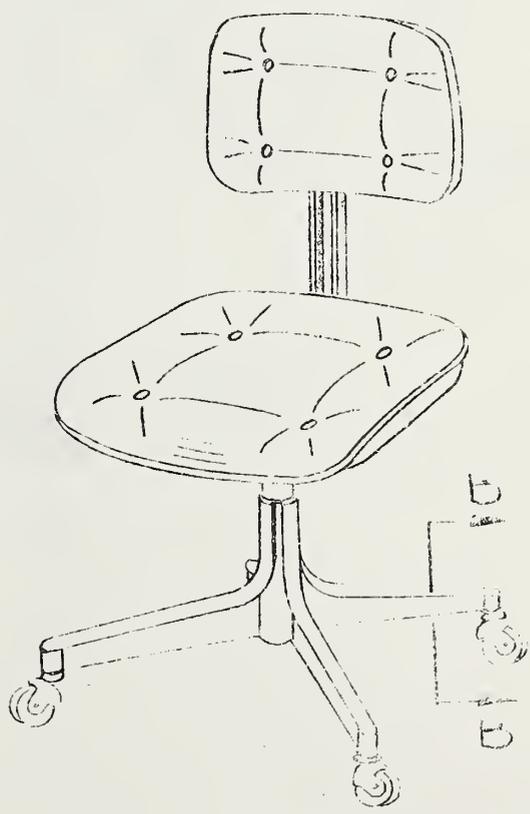
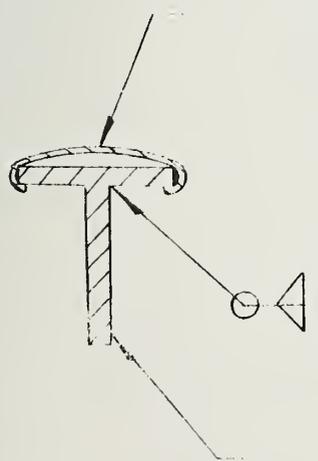
Type III, Style B



Type IV, Style B

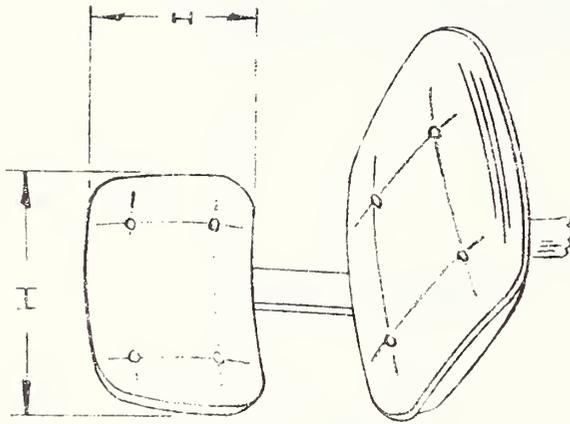
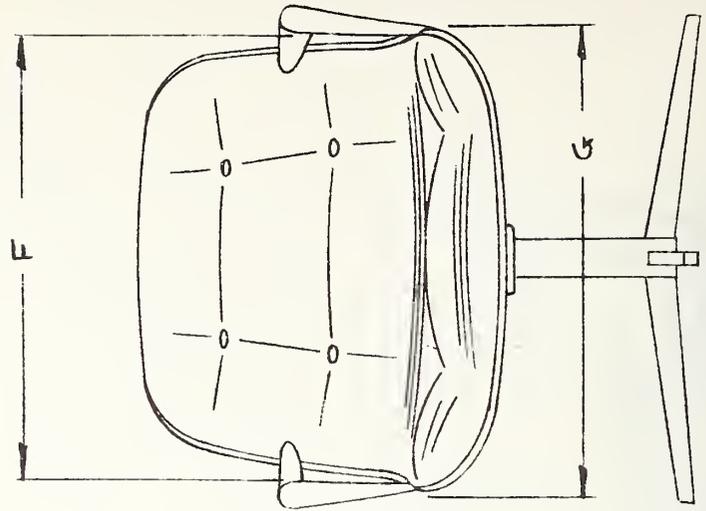


Base note:  
Either of the two basic base designs shown hereon are acceptable (see 3.4.3).

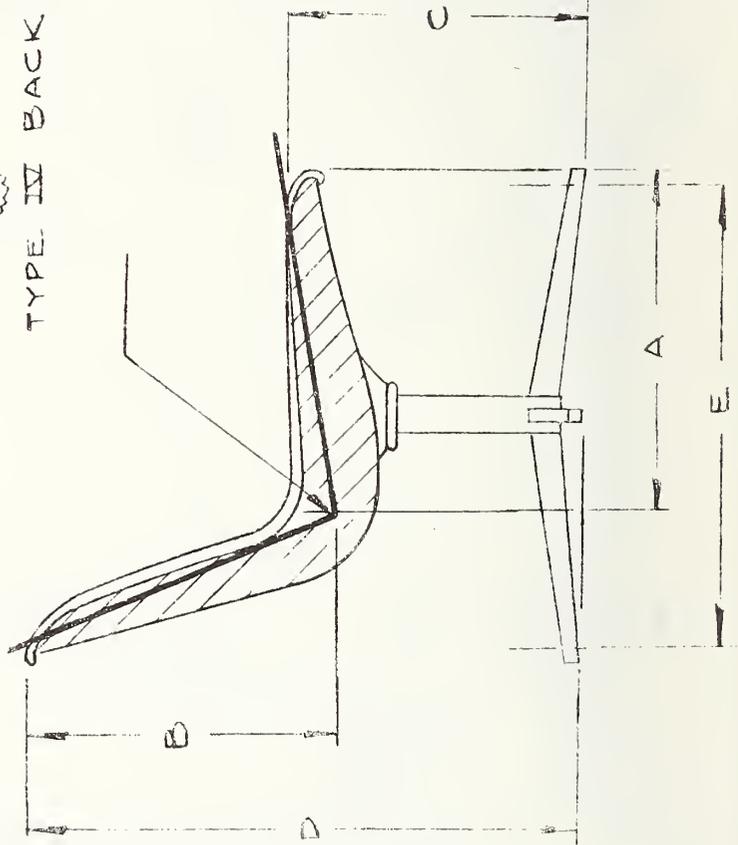


Type IV, Style B

Figure 4



TYPE IV BACK



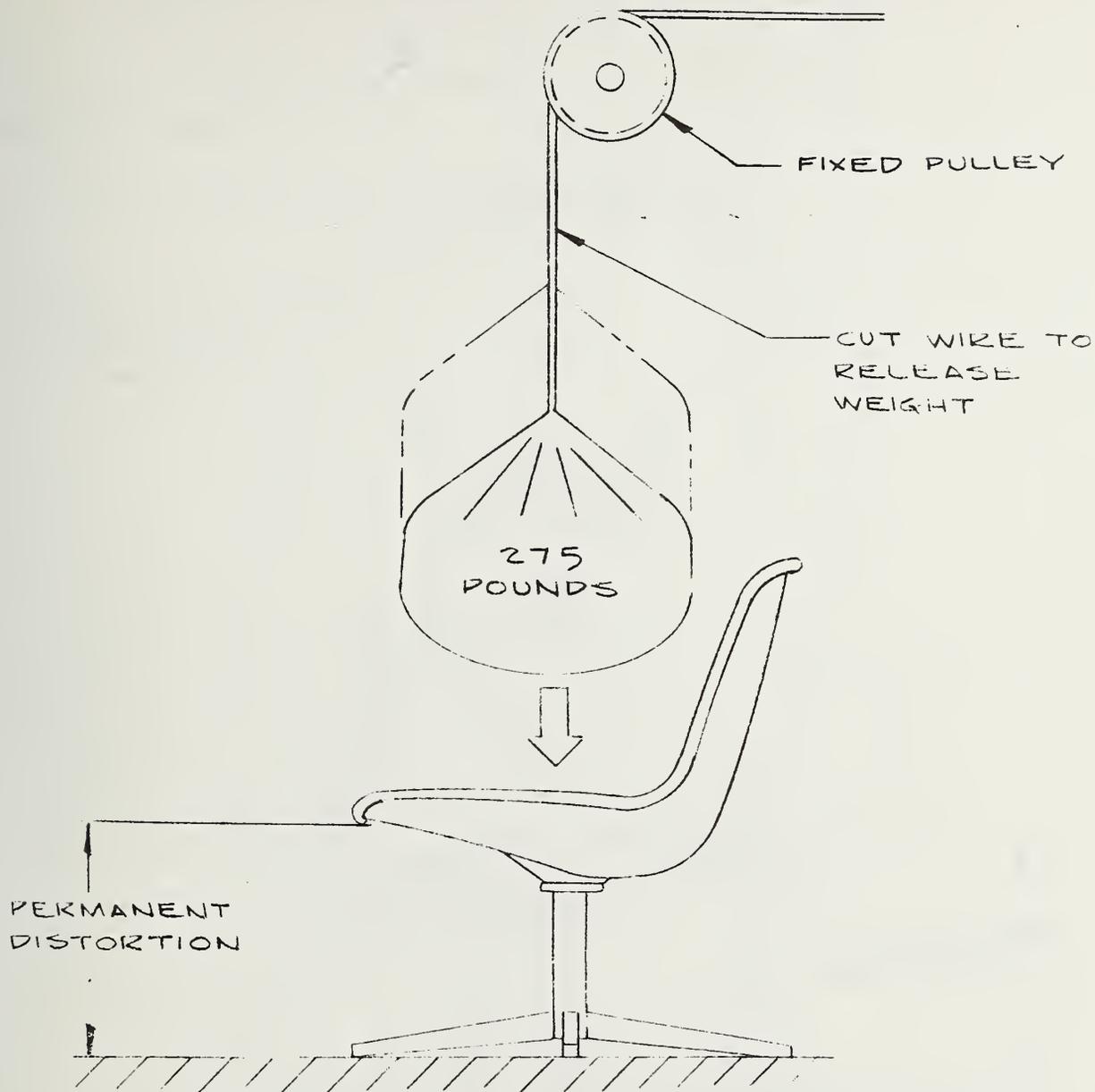


Figure 6

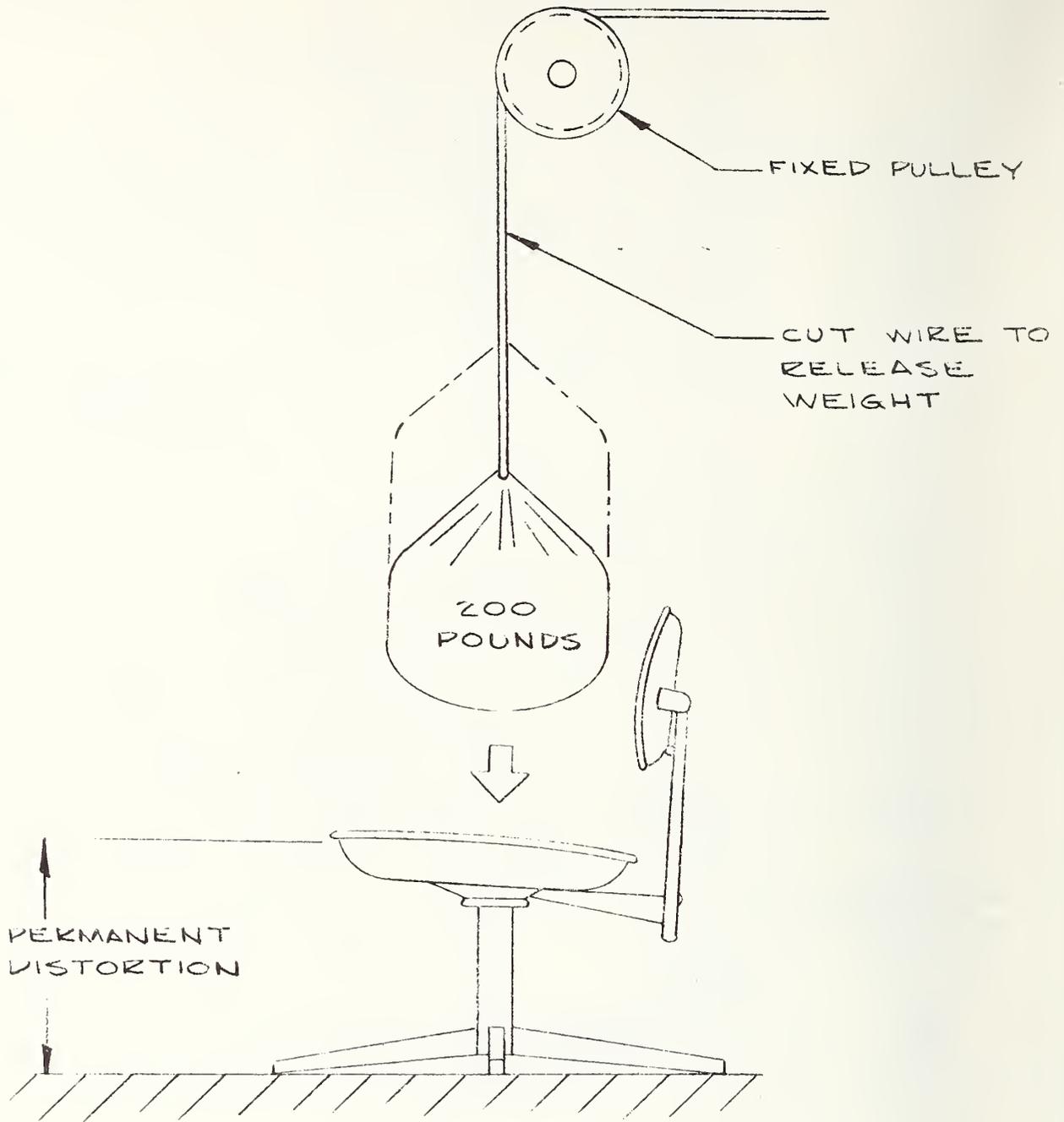


FIGURE CA

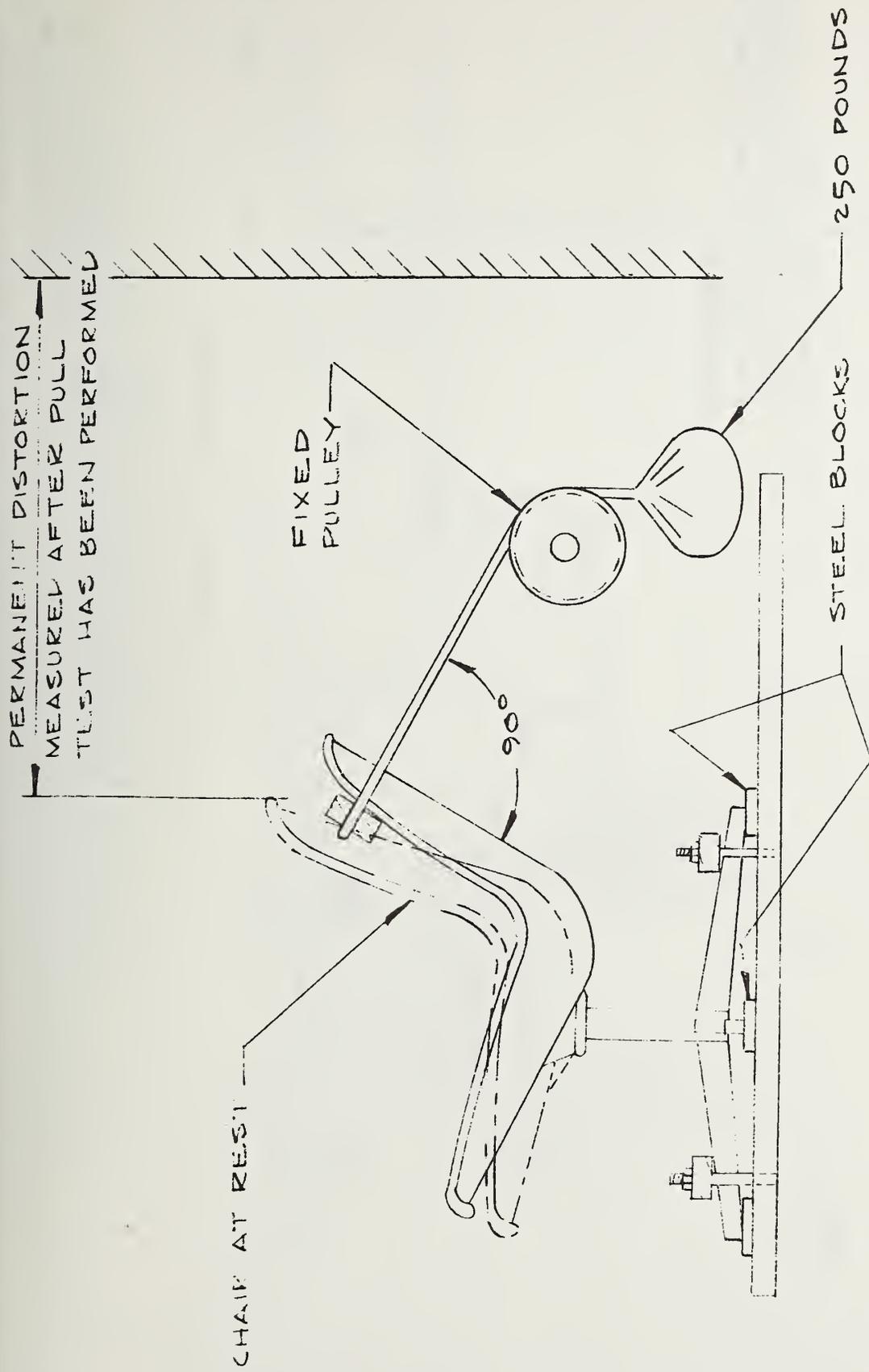


Figure 7

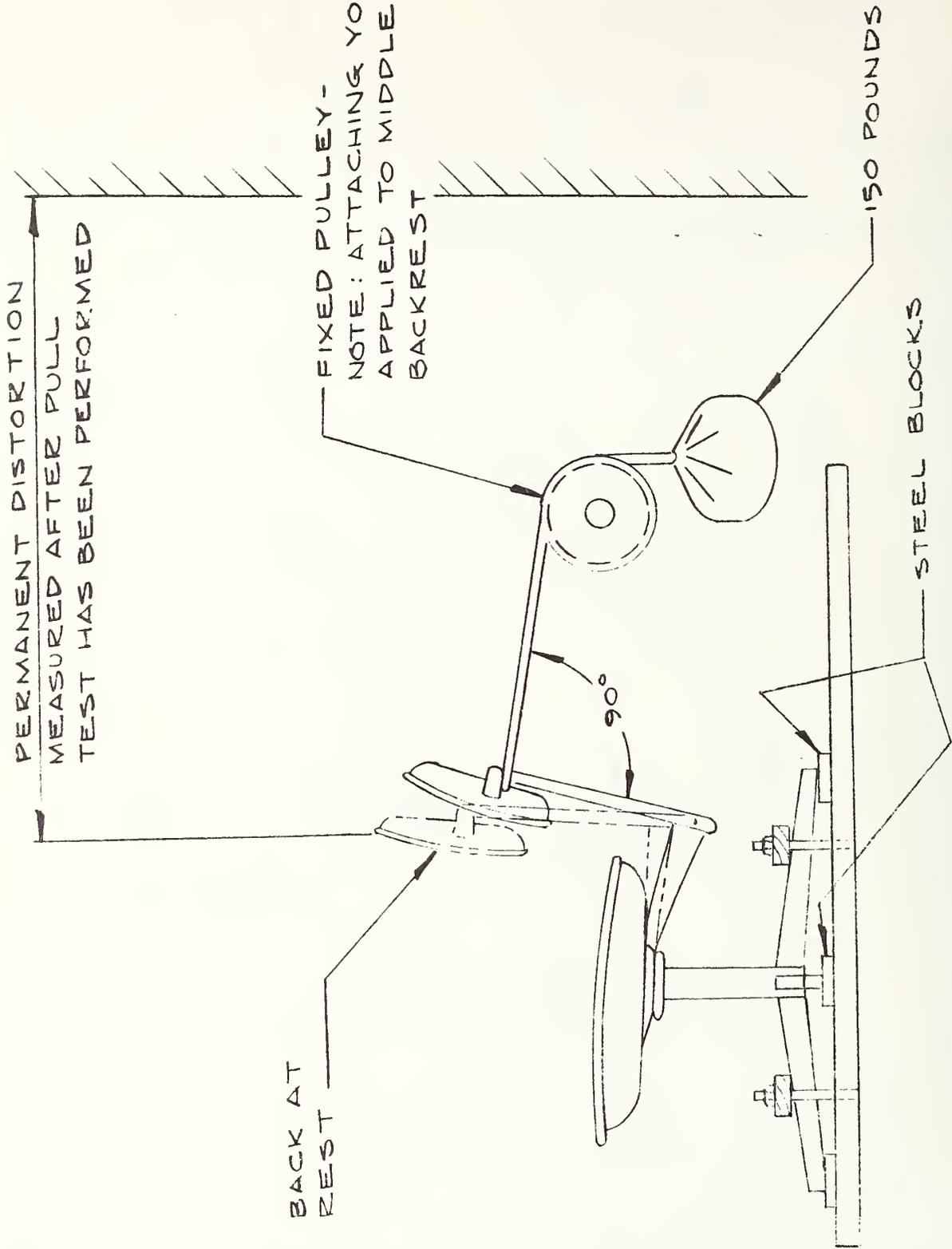


FIGURE 3

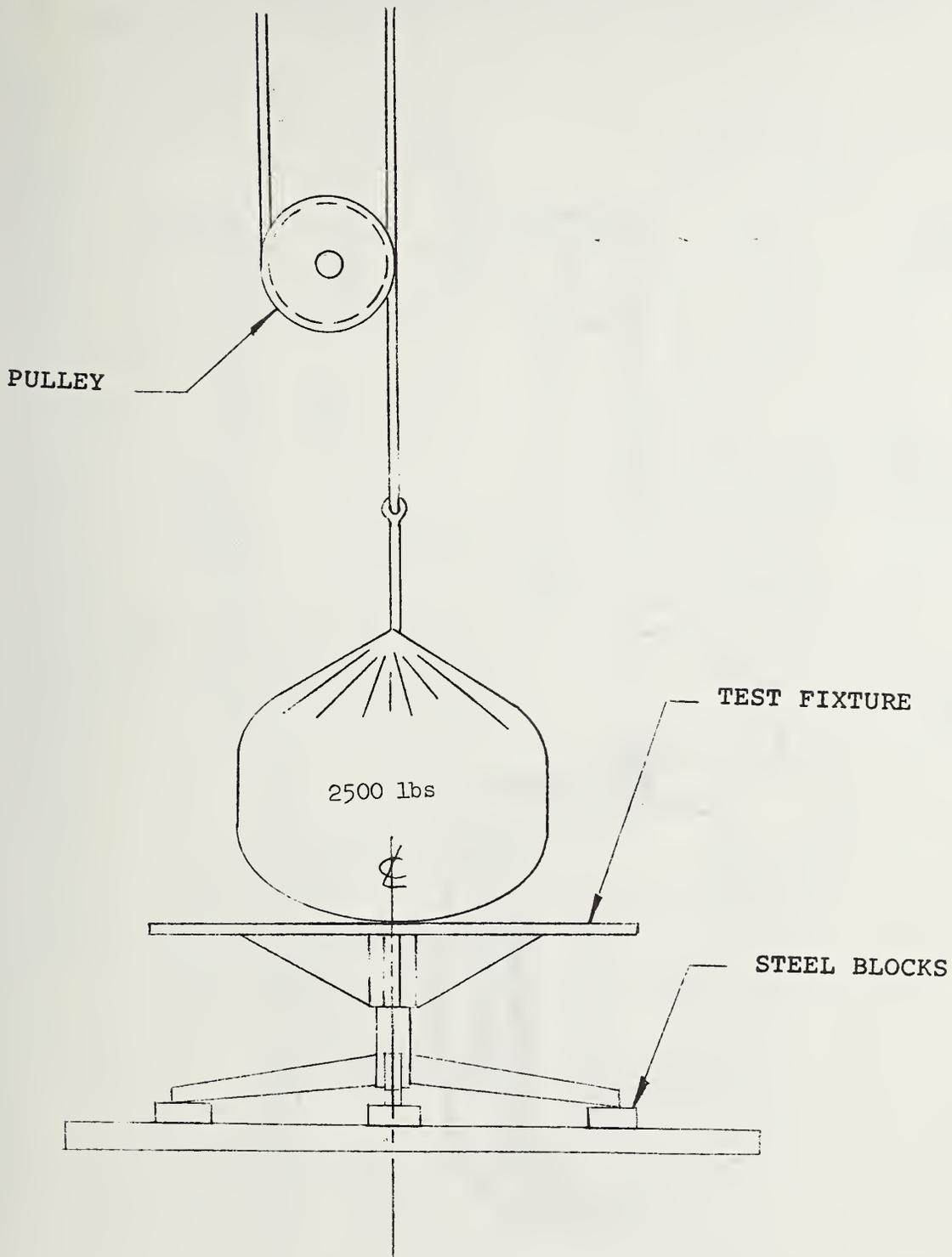


Figure 9

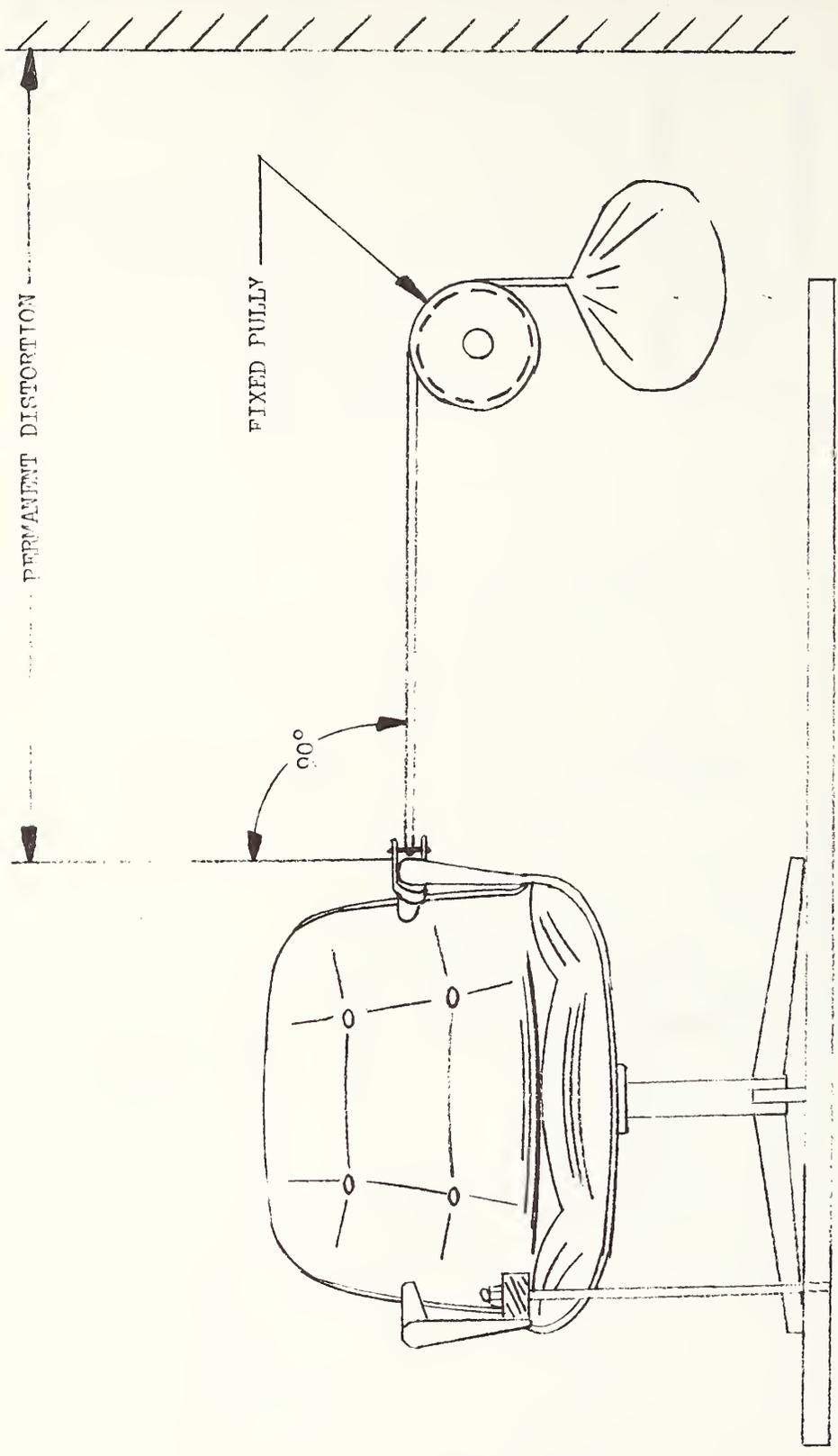


Figure 10

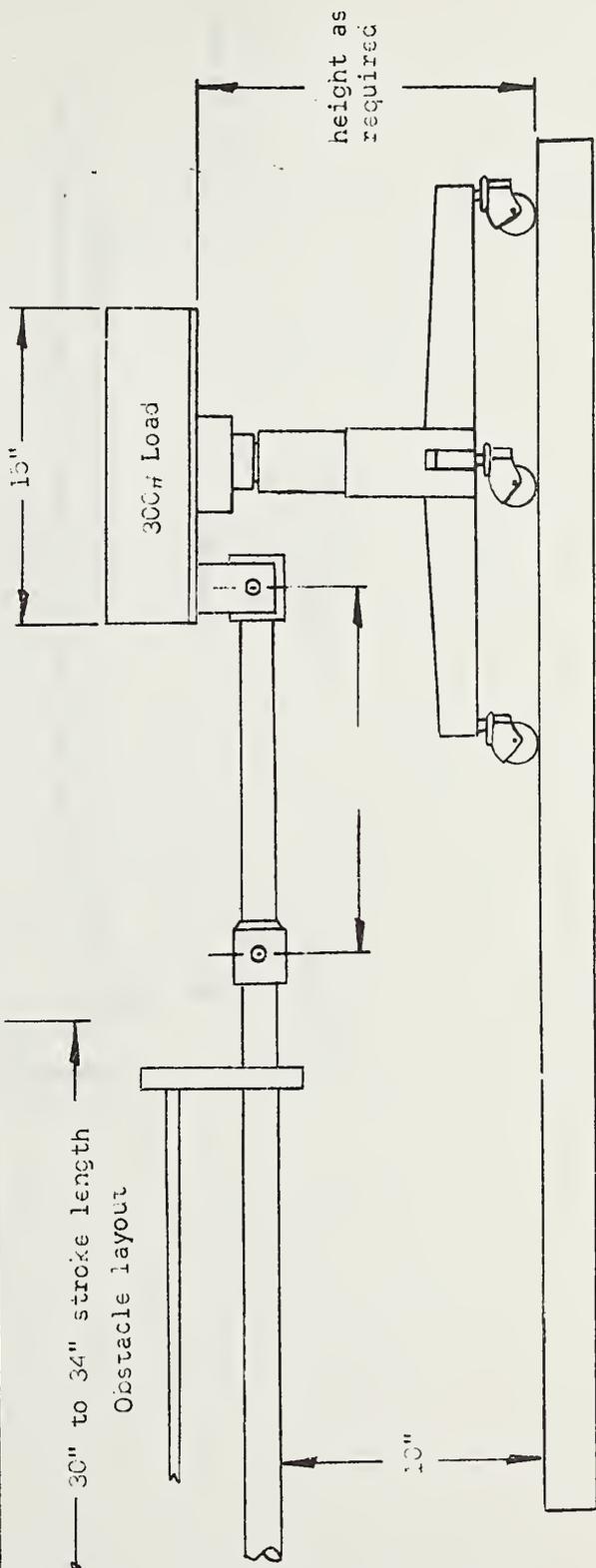
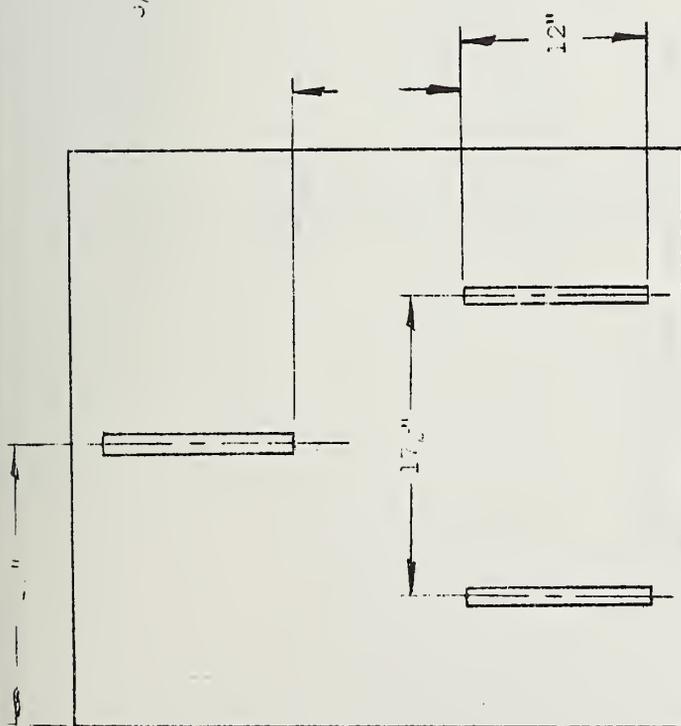
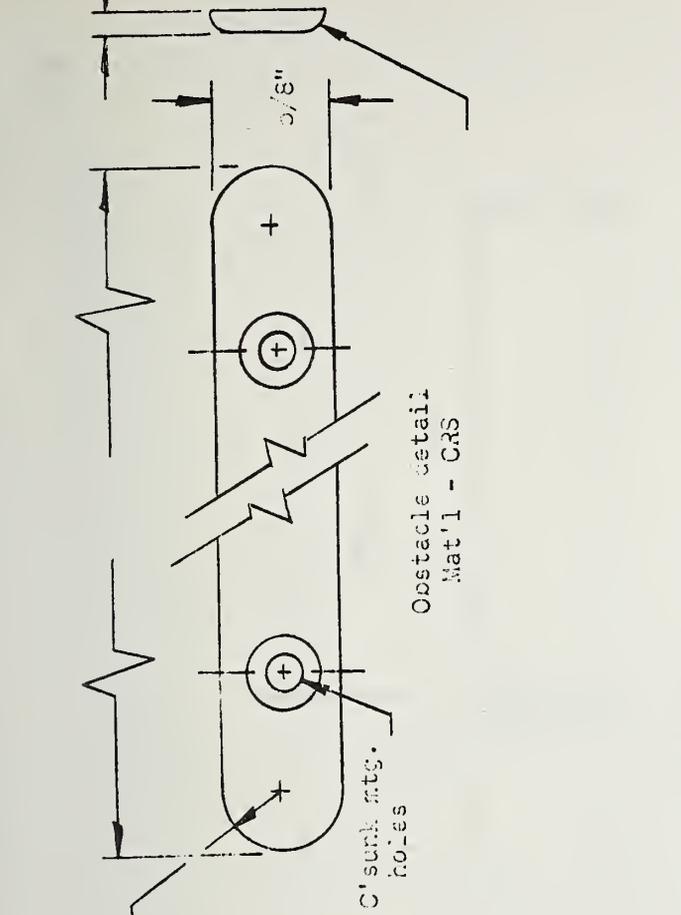


Figure 11

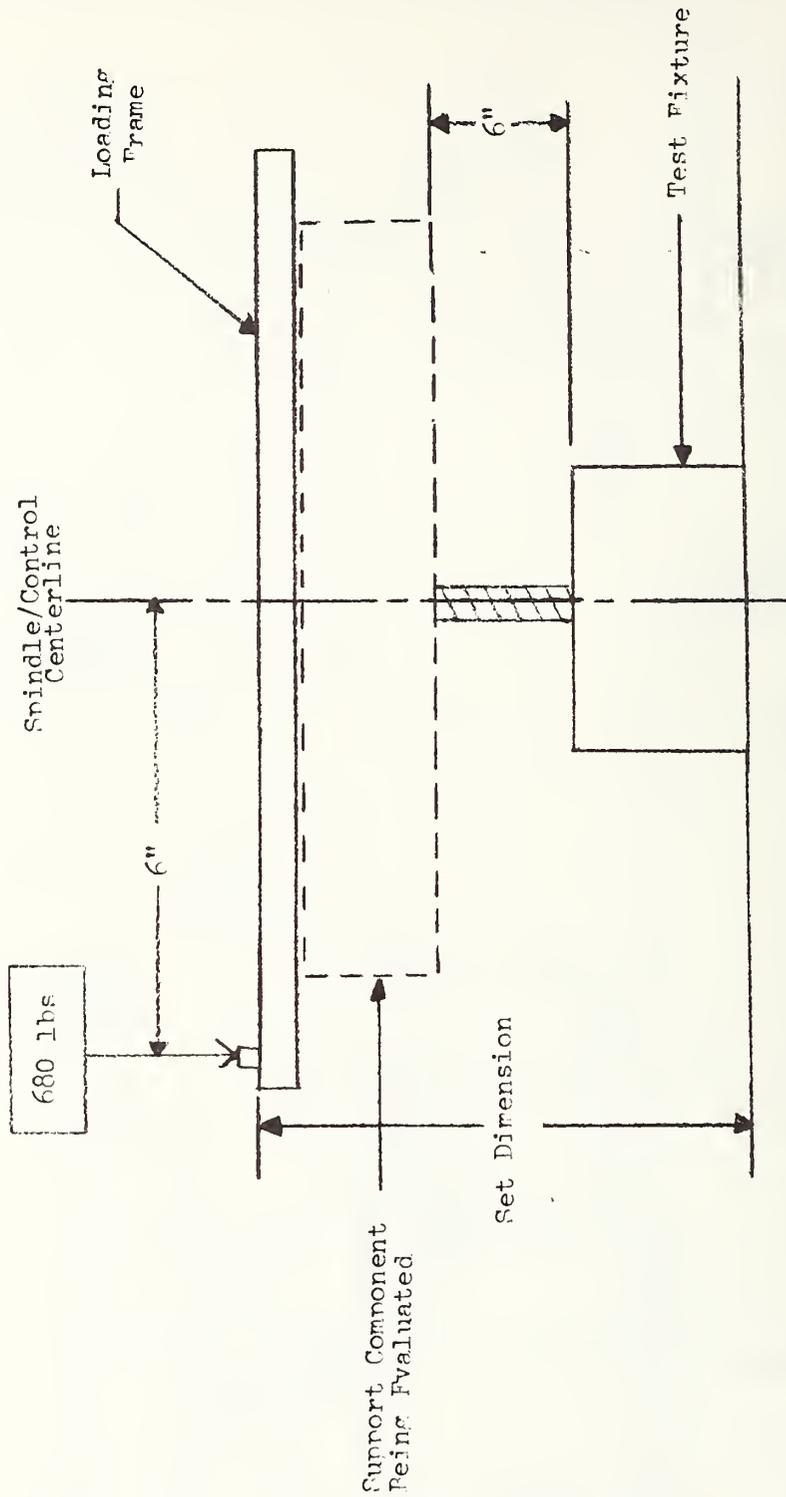


Figure 12

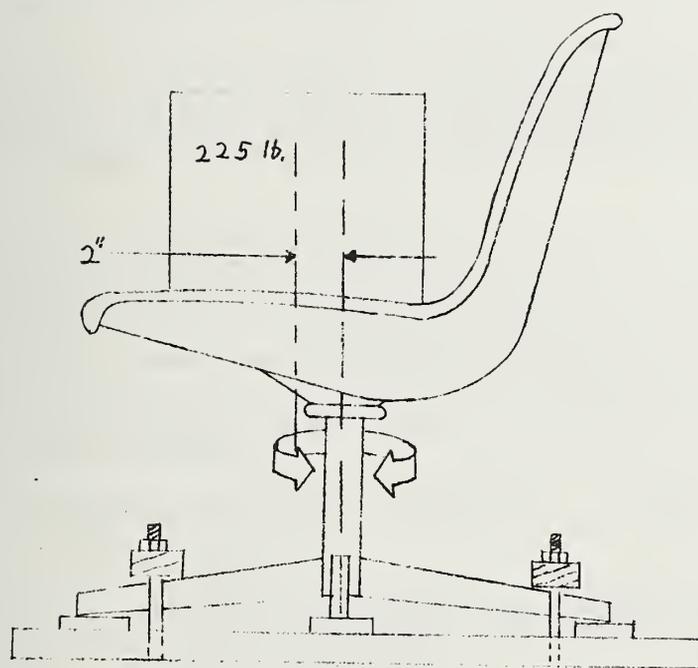


Figure 13



AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. AMENDMENT OR CONTRACT NO. <b>2</b>		2. EFFECTIVE DATE	3. REQUESTION/PURCHASE REQUEST NO.	4. PROJECT NO. (If applicable)
ISSUED BY <b>General Services Administration Federal Supply Service</b>		5. ADMINISTERED BY (If other than block 3)	6. (OFF)	

CONTRACTOR NAME AND ADDRESS  <i>(Street, city, county, state, and ZIP code)</i>		CODE	FACILITY CODE	7. AMENDMENT OF SOLICITATION NO. <b>FEFP-T5-71611-A-12-7-77</b>
				DATED <b>11-7-77</b> (See block 9)
				<input type="checkbox"/> MODIFICATION OF CONTRACT/ORDER NO.
				DATED _____ (See block 11)

8. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers  is extended,  is not extended. Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods:

a) By signing and returning 2 copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted, or (c) By separate letter or teletype which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If, by virtue of this amendment you desire to change an offer already submitted, such change may be made by teletype or letter, provided such teletype or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

9. ACCOUNTING AND APPROPRIATION DATA (If required)

10. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS

(a)  This Change Order is issued pursuant to \_\_\_\_\_  
 The Changes set forth in block 12 are made to the above numbered contract/order.

(b)  The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data, etc.) set forth in block 12.

(c)  This Supplemental Agreement is entered into pursuant to authority of \_\_\_\_\_  
 It modifies the above numbered contract as set forth in block 12.

11. DESCRIPTION OF AMENDMENT/MODIFICATION

THE ABOVE NUMBERED SOLICITATION FOR FSC, 7110 - CHAIRS, DOUBLE SHELL, ROTARY, CONTEMPORARY STYLE IS AMENDED AS FOLLOWS:

1. Due to a specification change, BID OPENING scheduled for December 7, 1977 is HEREBY POSTPONED INDEFINITELY.
2. Bidders will be notified of the new opening date by Amendment.

Bids already received will be held unopened until new bid opening time. However, such bids may be modified or withdrawn as provided in Paragraph 7, Standard Form 33A.

Address Acknowledgements to: **General Services Administration (Bid Room 1701)  
 IFB FEFP-T5-71991-A-12-7-77  
 7th & D Streets, S.W.  
 Washington, DC 20407**

Except as provided herein, all terms and conditions of the document referenced in block 8, as heretofore changed, remain unchanged and in full force and effect.

12.  CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT  CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN \_\_\_\_\_ COPIES TO ISSUING OFFICE

14. NAME OF CONTRACTOR/OFFEROR		17. UNITED STATES OF AMERICA	
BY _____ (Signature of person authorized to sign)		BY _____ (Signature of Contracting Officer)	

15. NAME AND TITLE OF SIGNER (Type or print)	16. DATE SIGNED	18. NAME OF CONTRACTING OFFICER (Type or print)	19. DATE SIGNED
--	-----------------	---	-----------------

the bottom end of the spindle and a steel "J" washer shall be used. Spindles having a cut thread may have plastic or metal "J" washers. When the top of the spindle housing (base hub) does not have a plastic bearing surface the spindles having a cut thread must have plastic "J" washers and the spindles having rolled threads must have plastic "J" washers between the steel "J" washer and the top of the spindle housing. The threads and the keyway slots on all spindles shall be free of burrs and sharp edges."

Page 17, Para. 5.1 - Delete in its entirety and substitute the following:

"5.1 Level B Packaging. All finished surfaces of the chair that come in contact with the inside of the shipping container or other parts of the chair shall be covered with cushioning material which shall be secured in place with tape or twine. The cushioning material must extend a minimum of 2 inches below and beyond all points of contact. The cushioning material shall be in the form of pads which shall be made of any of the following materials: macerated paper, wood wool packing, wood fiber felt or creped cellulose wadding. The cushioned chair shall then be wrapped in a polyethylene bag or shroud a minimum of 1 mil thick to protect the upholstered surfaces from dust. In lieu of individually covering all surfaces of the chair coming in contact with the shipping container, the chair shall be wrapped in single cushioned bag which shall be securely fastened at the bottom with pressure sensitive tape. The bag shall be constructed from cellulose or plastic foam cushioning material having a minimum thickness of .060 inches and a 30 pound basis weight kraft paper backing.

Bids already received will be held unopened until new bid opening time. However, such bids may be modified or withdrawn as provided in paragraph 7, Standard Form 33A.

Address Acknowledgements to: General Services Administration (Bid Room 1701)  
IFB FEFP-T5-71611-A-12-22-77  
7th & D Streets, S.W.  
Washington, D.C. 20407

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. AMENDMENT NUMBER	2. EFFECTIVE DATE	3. REQUISITION/PURCHASE REQUEST NO.	4. PROJECT NO (If applicable)
3	12-8-77		
ISSUED BY		6. ADMINISTERED BY (If other than block 3)	
General Services Administration Federal Supply Service			

CONTRACTOR NAME AND ADDRESS	CODE	FACILITY CODE	8. AMENDMENT OF SOLICITATION NO.
			FEFF-T5-71611-A 12-7-77
DATED			11-7-77 (See block 9)
			MODIFICATION OF CONTRACT/ORDER NO.
			DATED
			(See block 11)

9. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers  is extended,  is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods:

(a) By signing and returning 2 copies of this amendment, (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or teletype which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If, by virtue of this amendment you desire to change an offer already submitted, such change may be made by teletype or letter, provided such teletype or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

10. ACCOUNTING AND APPROPRIATION DATA (If required)

11. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS

(a)  This Change Order is issued pursuant to \_\_\_\_\_  
The Changes set forth in block 12 are made to the above numbered contract/order.

(b)  The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data, etc.) set forth in block 12.

(c)  This Supplemental Agreement is entered into pursuant to authority of \_\_\_\_\_  
It modifies the above numbered contract as set forth in block 12.

12. DESCRIPTION OF AMENDMENT

THE HOUR AND DATE SPECIFIED FOR RECEIPT OF OFFERS IS ESTABLISHED TO 1:30 P.M. LOCAL TIME AT THE PLACE OF BID OPENING, DECEMBER 22, 1977.

THE ABOVE NUMBERED SOLICITATION FOR FSC 7110 - CHAIRS, DOUBLE SHELL, ROTARY, CONTEMPORARY STYLE IS AMENDED AS FOLLOWS:

Page 15, Para. 3.2.5.4.6 Chassis, spider arms and spindle. Delete the sentence beginning in line 3 and substitute the following:

The spindle shall be cold drawn steel one inch (plus 0.000 inch, minus 0.002 inch) in diameter and fitted to the chassis by a method which provides a secure, permanent attachment. Either a cut thread or a rolled thread may be used on the spindle. The threads of the cut thread spindle shall terminate at a minimum of 2-1/2 inches from the bottom end. Alternatively, when the base hub supports the spindle by means of two hub bearings centered not less than 4 inches nor more than five inches apart, the threads on the cut thread spindle shall terminate at a minimum of one inch from the bottom end. The supporting length of both the upper and lower hub bearings shall be a minimum of one inch. On a rolled thread spindle, the keyway slot shall terminate at a minimum of 2-1/2 inches from the bottom end.

Except as provided herein, all terms and conditions of the document referenced in block 8, as heretofore changed, remain unchanged and in full force and effect.

13.  CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT  CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN \_\_\_\_\_ COPIES TO ISSUING OFFICE

14. NAME OF CONTRACTOR/OFFEROR	17. UNITED STATES OF AMERICA		
BY _____ (Signature of person authorized to sign)	BY _____ (Signature of Contracting Officer)		
15. NAME AND TITLE OF SIGNER (Type or print)	16. DATE SIGNED	18. NAME OF CONTRACTING OFFICER (Type or print)	19. DATE SIGNED

DEVIATIONS FROM INTERIM FEDERAL SPECIFICATION AA-C-001771B CHAIRS,  
DOUBLE SHELL, MOULDED PLASTIC, ROTARY, UPHOLSTERED, DATED AUGUST 1,  
1975.

Page 3

Paragraph 3.2.2 Polyurethane Foam. Table I, Density Pounds/In. Ft.  
under "Low Density" delete "1.8 - 2.2" and substitute "1.4 min."

Page 4

Paragraph 3.2.3 Upholstery Fabric. Under the heading "Requirement" add  
superscript "3/" to the number "8000". Add the following footnote to  
the end of the paragraph: "3/ There shall be no yarn bread. A break  
means the complete breaking of a yarn."

Paragraph 3.2.5.2 Castors. Delete the first sentence in the paragraph  
and substitute the following sentences:

"The casters shall be Type I, Style A of FF-C-82 with 3/8 inch or 7/16  
inch diameter stem permitted. The wheel tread material shall be rubber  
with a hardness of not less than 85 nor more than 95 as measured on the  
A scale of the Shore durometer. Tapered wheels which are 15/16 inch  
thick at the axle and tapered to 1/2 inch at the outer circumference  
will be permitted."

Page 6

Paragraph 3.2.5.4.6 Chassis, spider arms and spindle. Delete the  
sentence beginning in line 3 and substitute the following:

"The spindle shall be cold drawn steel one inch (plus 0.000 inch, minus  
0.002 inch) in diameter and fitted to the chassis by a method which  
provides a secure, permanent attachment. Either a cut thread or a  
rolled thread may be used on the spindle. The threads on the cut thread  
spindle shall terminate at a minimum of 2-1/2 inches from the bottom  
end. On a rolled thread spindle, the keyway slot shall terminate at a  
minimum of 2-1/2 inches from the bottom end of the spindle and a steel  
"J" washer shall be used. Spindles having a cut thread may have plastic  
or metal "J" washers. When the top of the spindle housing (base hub) does  
not have a plastic bearing surface, the spindles having a cut thread  
must have plastic "J" washers and the spindles having rolled threads  
must have plastic "J" washers between the steel "J" washer and the top  
of the spindle housing. The threads and the keyway slots on all spindles  
shall be free of burrs and sharp edges".

Page 7

Footnote 1/. Delete footnote 1/ in its entirety and substitute the fol-  
lowing:

"1/ Points at which measurements are taken are as shown in figure 5,  
except measurement C for Type I, II and IV chairs and measurement  
D for the Type I and II chairs are taken from the floor with the

Page 8

Paragraph 3.4.3 Base, subparagraph (a), lines 9 and 10. Delete the statement in parenthesis and substitute the following parenthetical statement "(minus the length of the exposed neck area)". Line 10, delete the words "The steel hub shall be a minimum of 5 inches long and".

Page 9

Paragraph 3.4.4.1.1 add the following to the end of the paragraph:

"Alternatively, the chair control spider shall be secured to the outer shell by passing bolts through the spider and outer shell and screwing into a 1/8 inch thick galvanized steel plate placed on the inner side of the outer shell."

Page 10

Paragraph 3.4.6.1.6 Seat and back padding. Subparagraph (a). On line 3 delete "1-3/4" and substitute "1-1/2". On line 5 delete "1-1/2" and substitute "1-3/4".

Page 11

Paragraph 3.4.6.1.7 Upholstery cover and shell attachment. Subparagraph (a), line 9. After the word "staples" add "or hot melt adhesive". Subparagraph (b), line 8. After the word "staples" add "or hot melt adhesive".

Page 13

Paragraph 3.4.6.6.8 Seat upholstery cover and shell attachment. On line 10 after the word "staples" add "or hot melt adhesive".

Page 17

Paragraph 4.5.4.1 Arm deflection test, Line 3. Delete "5/16" and substitute "3/4".

Paragraph 4.5.7 Spindle attachment test. Delete the last sentence and substitute the following:

"The spindle shall comply with each test in subparagraphs (a) and (b).

(a) The spindle shall remain unmoved after a torque of 100 foot pounds is exerted to turn or displace the spindle by use of a tool, such as a wrench.

(b) A force of 1,500 pounds shall be applied to the spindle in the direction of its removal from the control. The force shall be applied at a rate of 1.25 inches per minute. The spindle shall not be dislodged or moved from its intended position in the control."

Page 18

Paragraph 4.5.13 Delete the paragraph in its entirety and substitute the following paragraph.

"4.5.13 Tilting mechanism back stop and durability test. The test shall be performed on the Type I, II, and IV chairs. The test may be performed on the entire chair or alternatively, on the chair without the upholstery. The chair shall be secured to a test platform with casters removed. The chair controls shall be set at normal use condition or at mid-point. A cycling device shall be attached to the chair back (front push or back pull) so that the load is applied 16 inches from the seat; or to the top of the back frame if the frame is lower than 16 inches from the seat; or to the pivot point of a pivoting back. The cycling device shall apply a 100 pound force to the chair back of the Type I and II chairs and a 75 pound force to the back of the Type IV chair.

The force shall be normal to the plane of the back at the back stop position. A weight of 100 pounds shall be secured to the center of the chair seat. The device shall cycle the chair for 120,000 cycles at a frequency of 40 cycles per minute maximum. After completion of the cycles, any structural breakage or loss of serviceability or failure of any part of the chair shall be cause for rejection.

Paragraph 5.1 Delete the paragraph in its entirety and substitute the following:

5.1 Level B Packaging. All finished surfaces of the chair that come in contact with inside of the shipping container or other parts of the chair shall be completely covered with cushioning material which shall be secured in place by either tape or twine. The cushioning material must extend at least 2 inches below and beyond points of contact. The cushioning material shall be in the form of pads which may be made of any of the following materials; Macerated paper, wood wool packing, wood fiber felt or craped cellulose wadding. When this option is exercised, the chair shall be wrapped in a polyethylene bag or shroud a minimum of 1.25 mils thick to protect the upholstered surfaces from dust. In lieu of individually covering all surfaces of the chair coming in contact with the container, the disassembled parts of the chair shall be wrapped in a manner that will prevent contact with one another and placed with the chair in a cushioned bag which shall be securely fastened at the bottom with pressure sensitive tape. The bag shall be constructed from cellulosic or plastic foam cushioning material having a minimum thickness of .060 inches and a 30 pound minimum basis weight kraft paper backing.

5.2 Level B Packing. Chairs packaged as specified in 5.1 above shall be individually packed in close-fitting boxes conforming to PPP-B-636, class domestic, variety DW, grade 275 minimum. Necessary blocking and bracing to prevent movement of the chair within the box during shipment and storage shall be utilized as required. The boxes shall be closed in accordance with method I or II of the appendix to PPP-B-636.

5.3 Marking. Marking shall be in accordance with Fed. Std. No. 123.

5.3.1 Precautionary marking. Each box shall be marked as follows, in characters a minimum of 3/4 inch high:

Top of Box:

TOP  
THIS SIDE UP  
FRAGILE-HANDLE WITH CARE

Two sides of box:

UP FURNITURE UP  
FRAGILE-HANDLE WITH CARE

5.3.2 Color identification marking. To facilitate color identification, the two sides of the box with the fragile marking shall have an area approximately 3 x 8 inches painted to approximate the color of the fabric of the chair, contained therein. Alternatively, color panels of the size specified above shall be applied to the container. The adhesive used shall be of such quality as to assure that the color panels will not loosen or become detached from the box during handling and shipment.



<b>4. TITLE AND SUBTITLE</b>  Examination of "Upholstered, Rotary, Molded Plastic, Double Shell Chairs"	<b>5. Publication Date</b>
	<b>6. Performing Organization Code</b>

<b>7. AUTHOR(S)</b>  Sushinsky, G.; Toner, S.; Cuthrell, W.	<b>8. Performing Organ. Report No.</b>
---	--

<b>9. PERFORMING ORGANIZATION NAME AND ADDRESS</b>  NATIONAL BUREAU OF STANDARDS DEPARTMENT OF COMMERCE WASHINGTON, DC 20234	<b>10. Project/Task/Work Unit No.</b>
	<b>11. Contract/Grant No.</b>

<b>12. SPONSORING ORGANIZATION NAME AND COMPLETE ADDRESS (Street, City, State, ZIP)</b>  Subcommittee on Federal Spending Practices Committee on governmental Affairs United States Senate Washington, D. C. 20510	<b>13. Type of Report &amp; Period Covered</b>
	<b>14. Sponsoring Agency Code</b>

**15. SUPPLEMENTARY NOTES**

Document describes a computer program; SF-185, FIPS Software Summary, is attached.

**16. ABSTRACT** (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)

At the request of the Senate Subcommittee on Federal Spending Practices and Open Government, the National Bureau of Standards conducted tests on 10 "double shell" chairs to determine their compliance with Federal Specification AA-C-001771B, 8-1-75 (Contract Deviation and Amendment 3). These tests were centered in the Product Performance Engineering Division of the Center for Consumer Product Technology. Chairs from each of five manufactueres of "double shell" chairs were inspected for visual, dimensional, material, and physical characteristics for adherence to the requirements in the specification documents. Mechanical tests were also performed where possible. The results of these evaluation procedures and tests are summarized in tabular form by type of evaluation for all chairs and for each chair individually. All chairs failed to meet several of the requirements of the Federal Specification.

**17. KEY WORDS** (six to twelve entries; alphabetical order; capitalize only the first letter of the first key word unless a proper name; separated by semicolons)

Chairs; "double shell" chairs' materials; physical characteristics; specification compliance; testing and evaluation

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